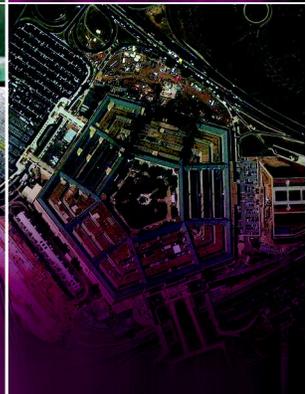

EFFECTS OF CATASTROPHIC EVENTS ON TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS

*The Pentagon and the National Capital Region
September 11, 2001*



March 2002

U.S. Department of Transportation
ITS Joint Program Office



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16. Abstract This report documents the actions taken by transportation agencies in response to the earthquake in Northridge, California on January 17, 1994, and is part of a larger effort to examine the impacts of catastrophic events on transportation system facilities and services. The findings documented in this report are a result of a detailed literature search on Northridge lessons learned. As part of a larger effort, four case studies will be produced:					
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Foreword

This report was prepared by Science Applications International Corporation (SAIC) for the U.S. DOT's Intelligent Transportation Systems (ITS) Joint Program Office. The SAIC study team consisted of Mark Carter, the project manager; Mark P. Howard; Nicholas Owens; David Register; Jason Kennedy; Aaron Newton; and Kelley Pecheux. Vince Pearce is the U.S. DOT task manager of the review.

The report documents the actions taken by transportation agencies in response to the terrorist attack on the Pentagon in Arlington, Va. on September 11, and is part of a larger effort to examine the impacts of catastrophic events on transportation system facilities and services. The findings documented in this report are a result of the creation of a detailed chronology of events in the National Capital Region, a literature search, and interviews of key personnel involved in transportation operations decision-making on September 11. As part of a larger effort, four case studies will be produced:

- ◆ New York City, September 11, 2001
- ◆ Washington, D.C., September 11, 2001
- ◆ Baltimore, Maryland, rail tunnel fire, July 18, 2001
- ◆ Northridge, California, earthquake, January 17, 1994.

Each of these events resulted in substantial, immediate, and adverse impacts on transportation, and each has had varying degrees of influence on the longer-term operation of transportation facilities and services in their respective region. Each event revealed important information about the response of the transportation system to major stress and the ability of operating agencies and their public safety and emergency management partners to respond effectively to a crisis. This report emphasizes the transportation aspects of this catastrophic event and lessons learned that could be incorporated into future emergency response planning.

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1.0 Introduction

1.1 Regional Context

An understanding of the regional context is important to making sense of the regional transportation response on September 11, 2001. The Washington, D.C. metropolitan area, also referred to as the National Capital Region, is among the most complex multijurisdictional environments in the United States. The profusion of state and local governments, along with federal agencies and regional transportation operating agencies, gives rise to significant challenges in coordination and cooperation. Aside from the challenge of coordination across political boundaries, the events of September 11 and the aftermath required coordination and cooperation from agencies with different jargons, command and control structures, and philosophies – the transportation, law enforcement, emergency management, and public safety communities that had to respond to the crisis.

Political Subdivisions

The National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) for the region, and plays an important role as the regional forum for transportation planning. MPOs prepare plans and programs that the Federal Government must approve in order for federal-aid transportation funds to flow to their regions. The TPB region covers a geographic area of 3,020 square miles, and contains over four million residents. For purposes of this report, the Washington, D.C. metropolitan area (“the Region”) will be considered in the context of the jurisdiction of the Transportation Planning Board region.

Members of the TPB include representatives of local governments, state transportation agencies, the Maryland and Virginia General Assemblies, the Washington Metropolitan Area Transit Authority, and non-voting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB region includes the District of Columbia, State of Maryland, the Commonwealth of Virginia, seven counties, and eleven communities within those counties.

Operating Agencies

In addition to the political subdivisions, a complex structure of agencies and organizations shares control of the transportation network. Operating agencies with responsibility for major highways in the area include the Maryland Department of Transportation (MDOT), the District of Columbia Department of Public Works (Transportation Division) (DCDPW), and the Virginia Department of Transportation (VDOT), as well as the National Park Service (NPS) for the region’s parkways and the Arlington Memorial Bridge. The Washington Metropolitan Area Transit Authority (WMATA) operates the

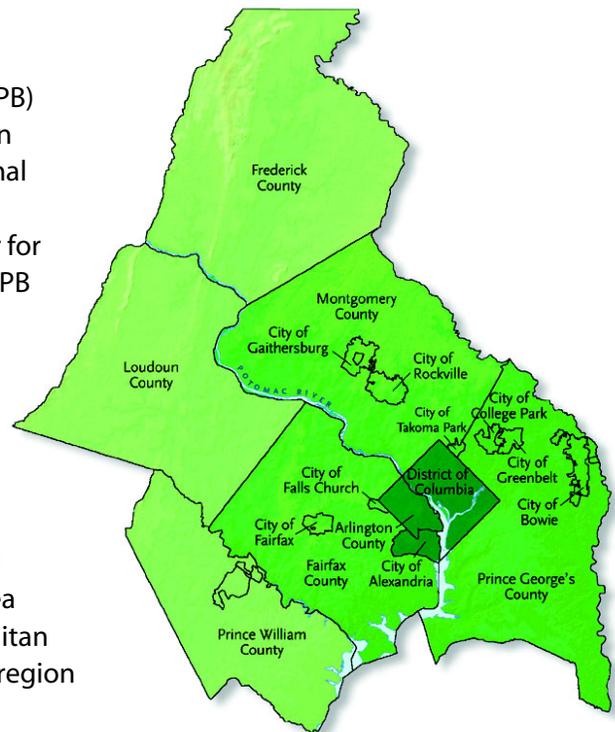


Figure 1. National Capital Region



Figure 2. Pentagon Fire Captured by Security Camera Moments After Impact

Metro rapid transit system and the bulk of surface bus service in the region, but local jurisdictions also run some transit service, including routes that utilize the newly redesigned Transit Center at the Pentagon.

Federal Agencies

Federal agencies often exercise control over the transportation network of the region. This became especially clear on September 11, as streets were closed at the direction of the Secret Service or Capitol Police to establish secure perimeters around critical governmental sites. The First Street Tunnel, which provides a link from the heavily traveled Northeast Corridor and Union Station to points south, was also shut down by federal officials on September 11.

The Precipitating Event: The Attack on the Pentagon

On Tuesday morning, September 11, American Airlines Flight 77 took off from Washington Dulles International Airport on a routine flight to Los Angeles. By 9:43 a.m., what was until then a normal flight had been hijacked by terrorists and was deliberately flown into the Pentagon as a missile.

Flight 77 to Los Angeles departed from Dulles at 8:10 AM. By 9:40 AM, Flight 77, now in the hands of terrorists, was approaching the Pentagon from the southwest, flying directly over the Virginia Department of Transportation's Northern Virginia Smart Traffic Center. The plane first hit a recently renovated wedge section near the heliport on the west side of the building before passing into an unrenovated area. The airliner crashed low and diagonally into the Pentagon's outside "E" ring limestone wall. The Pentagon consists of five concentric five-sided buildings that ring a park-like central courtyard. The

buildings are named A Ring to E Ring from the inside out. The hijacked aircraft slammed through the E, D, and C rings before coming to rest in an open-air service passageway separating the C and B rings.

The impact with the Pentagon, and the conflagration caused by the fuel, created a catastrophic structural failure of a large section of the wedge. Within minutes, the upper floors collapsed into the 100-foot-wide gap, which extended most of the way through the office rings to the central courtyard. In the Pentagon itself, 125 people died or remain unaccounted for. Another 64 people were aboard the hijacked plane that smashed into the building.

Some members of the Arlington County Virginia Fire



Figure 3. Public Safety Personnel Arrive at Scene



Figure 4. Aerial View of Pentagon Showing Damage

Department actually saw the plane fly overhead at a dangerously low altitude and knew something was wrong. When they heard a crash and saw the thick smoke, they headed toward the site. In minutes, they were joined by other firefighters providing aid to the wounded and working to put out the blaze. Arlington police officers, including one who actually saw the plane hit the building, soon arrived to help assist the wounded and to establish a perimeter around the site.

In comparison with the extensive impacts of the terrorist attack on the World Trade Center in New York, the attack on the Pentagon was relatively circumscribed. Even so, the tragic loss of life, the psychological impact, and the actions taken in response to the attack by local, state, and federal agencies had major impacts on the transportation system in the Washington, D.C. region.

2.0 Transportation System Response

2.1 Pre-Event

Transportation Infrastructure

Surface transportation facilities in the Washington, D.C. area are operated by three principal highway agencies, as noted previously (Maryland Department of Transportation, Virginia Department of Transportation, and the Division of Transportation within the District of Columbia Department of Public Works), by WMATA (Metro rapid transit and bus), and by a variety of local jurisdictions.

The Capitol Beltway (I-495) is the major circumferential route around Washington, D.C. The Beltway passes over the Potomac River (the dividing line between Maryland and the District of Columbia on the north, and Virginia on the south) via the American Legion Bridge to the west, and the Woodrow Wilson Bridge to the south. I-395 (the Henry Shirley Highway) connects the Capitol Beltway and I-95 from the south to the District via the George Mason Bridge and the Rochambeau Bridge. The Arland Williams Jr. Bridge (also known as the 14th Street Bridge) carries traffic from both I-395 and US Route 1 across the Potomac River. The Arlington Memorial Bridge, the Theodore Roosevelt Memorial Bridge (I-66), and the Key Bridge also serve traffic crossing the Potomac from Northern Virginia to the District.

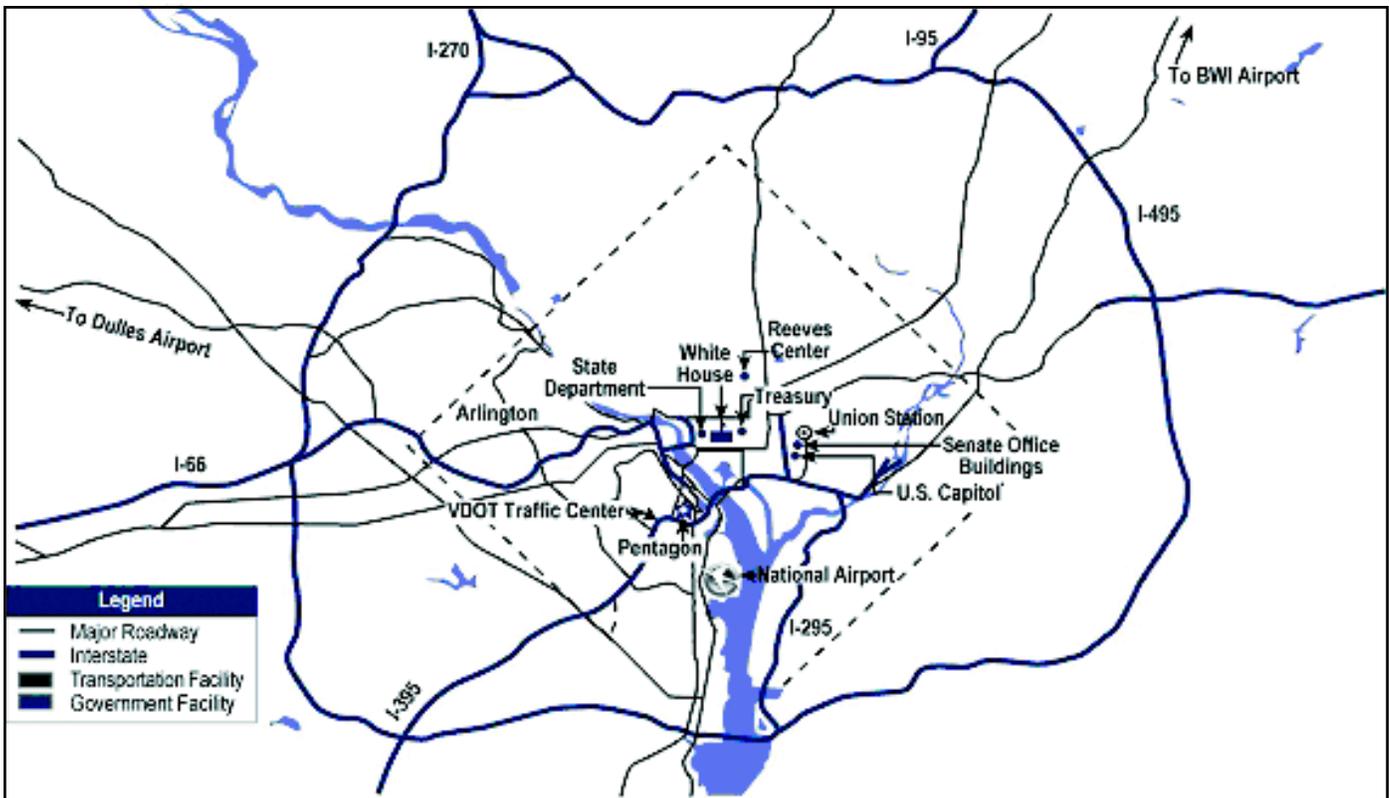


Figure 5. Principal Transportation Facilities in National Capital Region

It is useful to understand the differences in operating philosophies, responsibilities, and capabilities among the agencies that provide transportation services in the region. In the State of Maryland, MDOT (through its highway arm, the State Highway Administration – SHA) operates interstate highways and elements of the National Highway System, as well as numbered federal and state routes. The State of Maryland has made substantial investments in intelligent transportation systems (ITS) technology to manage its transportation network, with a number of regional Traffic Operations Centers (TOCs) and a Statewide Operating Center (SOC) coordinating the use of ITS assets. Lower classification roadways are operated by counties, the main political subdivision below the state level in Maryland. (There are only a handful of incorporated cities within Maryland, including the City of Baltimore, which operate their own roadway system; even in these instances the SHA operates and maintains interstate highways.) In the Washington, D.C. region, Montgomery and Prince George’s counties have responsibility for operating local roadways and some transit assets; Montgomery County has also been a leader in the use of ITS technology to manage its roadways and transit system. In addition to SHA and the counties, some roadways in Maryland, including the Baltimore-Washington Parkway, are operated by the National Park Service and patrolled by Park Service Police.

In the Commonwealth of Virginia, local authorities have little jurisdiction over the operation and maintenance of their roadways. VDOT manages the maintenance and operation of virtually all roadways, including most signal systems and deployed ITS assets. Some of the counties, however, do offer fixed-route or flexible transit services. VDOT manages most of its ITS assets in the Washington, D.C. metropolitan area from the Northern Virginia Smart Traffic Center (STC) in Arlington. VDOT also operates a separate traffic signal control center in Fairfax County. VDOT maintains a statewide Traffic Emergency Operating Center in the state capital, Richmond, to coordinate responses to major transportation crises.

The District of Columbia operates from offices in the Reeves Center, a city-owned office building, which also houses the D.C. Police Department command center and the D.C. Emergency Management Agency Emergency Management Center. While the District does have a centralized, computer-controlled traffic signal system, it has not yet deployed many other aspects of ITS. The District has plans to install a traffic management center in the Reeves Center, and has proposed an extensive ITS deployment plan in the aftermath of September 11.

The Washington Metropolitan Area Transit Authority (WMATA) operates 83 Metrorail stations and 103 miles of rapid transit line, with average weekday ridership of 593,000. WMATA also operates an extensive bus transit service throughout the region, with a fleet of 1,443 buses and 504,000 daily boardings. Metrorail and Metrobus maintain separate command centers, but in major emergencies, their functions are consolidated into a single, central command

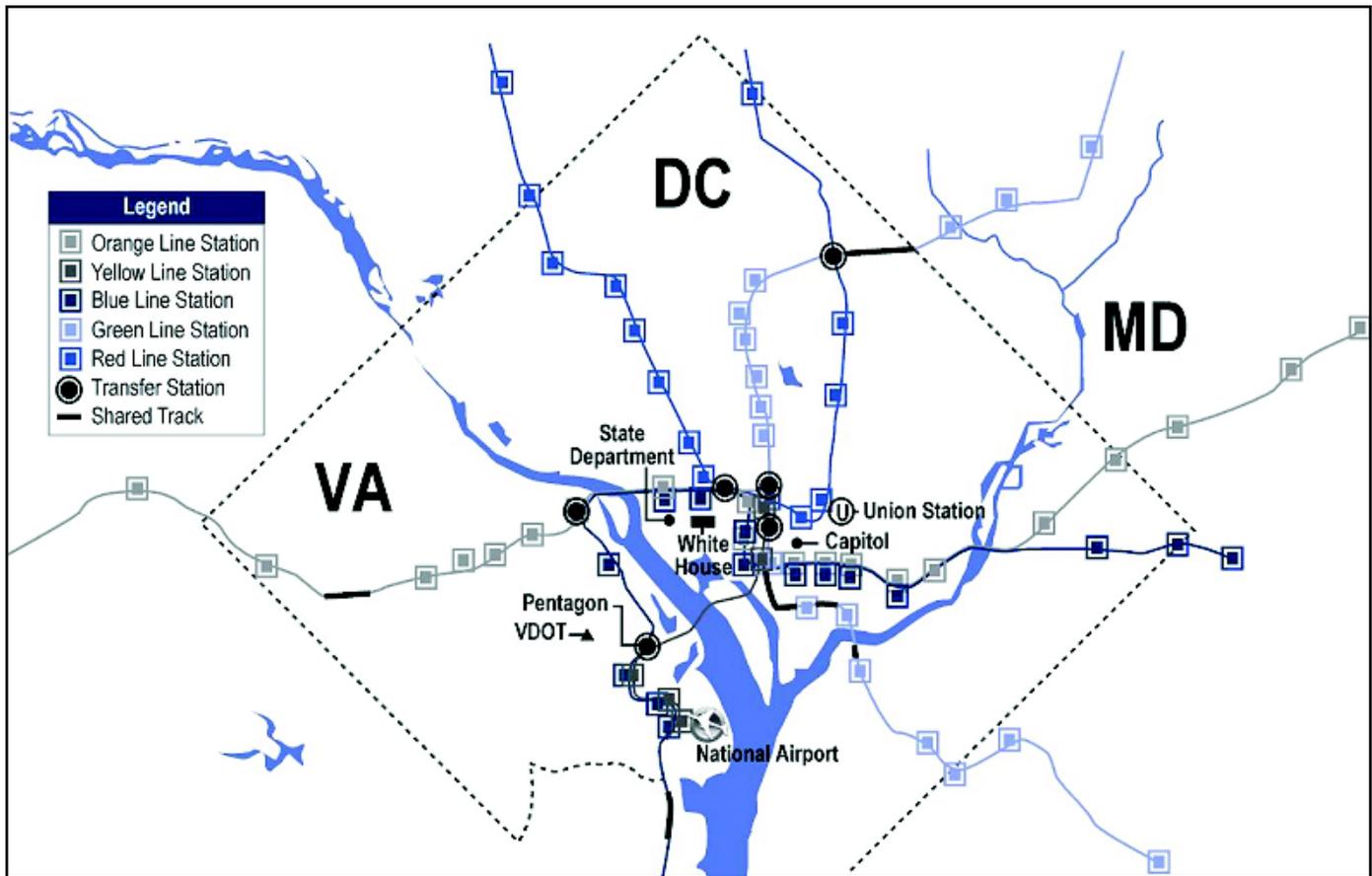


Figure 6. WMATA Metrorail System

post. The Metro Police department is also present in the central command post during emergencies, but can also operate out of several other locations throughout the service area.

Traffic Conditions and Transit Use

The Washington, D.C. metropolitan area is one of the most congested in the nation. Despite enjoying one of the highest proportions of transit use in the nation – 16 percent of commuters use transit to get to work – the D.C. region ranks high in measures of traffic congestion and travel delay. Metropolitan Washington, D.C. is in the top five among the nation’s 68 largest urbanized areas in five of the Texas Transportation Institute’s indices of congestion, and is in the top ten for all ten measures. Washington, D.C.-MD-VA ranks number three in the rate at which population increase outpaced roadway capacity expansion and in the percent of daily travel undertaken in congested conditions. The region also ranks number four in delay caused by heavy traffic flow and incidents, and number five in annual delay in person-hours per capita.

Like many other urbanized areas, the metropolitan Washington region has experienced rapid growth in suburban employment over the past four decades. Even so, because of the concentration of government-related employment and commercial activity in the core of the region, the Washington Metro heavy rail system is used by large numbers of commuters. Meanwhile, Washington, D.C. residents depend heavily on both Metrorail and the local

surface transportation system, Metrobus. (WMATA also offers paratransit service for the disabled through its wheelchair-equipped Metroaccess service.)

Commuter rail service to Washington, D.C. from Maryland is operated by the Maryland Transit Administration, part of MDOT, as MARC. MARC service runs to Union Station on three lines: two (the Camden Line over CSX tracks, and the Penn Line, which operates on Amtrak tracks) from Baltimore, Md.; and the Brunswick Line from Martinsburg, W.Va. and Frederick, Md., (which also operates on CSX tracks). In Virginia, The Virginia Railway Express (VRE) is a transportation partnership of the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission (PRTC). VRE provides commuter rail service from the Northern Virginia suburbs to Alexandria, Crystal City and downtown Washington, D.C. Express commuter bus service is also operated in the region by Metrobus and by a number of private carriers.

As noted above, the region is bisected by the Potomac River, which presents a significant barrier to mobility. The aging Woodrow Wilson Bridge on the Capital Beltway is a major regional bottleneck, and other river crossings are congested during peak periods and during special events. In fact, the region's transportation network is so heavily utilized that relatively minor incidents can cause substantial impacts on the network. The Metrorail system is also approaching some of its physical limits on capacity. The basic design of the system, with several branches sharing a limited number of tracks in the central business district, creates an inherent limit to the carrying capacity of the network. To significantly expand capacity in the future, according to WMATA, a new downtown rail tunnel and another Potomac River crossing would be needed. An incident that closed one of its downtown trunk lines or a major transfer station like Metro Center or L'Enfant Plaza could have considerable and long-lasting impacts on operations.

The principal regional forum for interagency communication is the National Capital Region Transportation Planning Board (TPB). In addition to the higher-level contacts maintained at the policy board level, the TPB has a number of technical committees where issues requiring coordination at the staff level are addressed. The agencies also have extensive working relationships, necessitated by operations at Potomac River crossings, for coordination of signal systems and other systems at political boundaries, and for coordination of transit operations with WMATA. There is also recognition of the need for improved communications among transportation, law enforcement, public safety, and emergency services agencies; a project is underway to improve communications through the Capital Wireless Integrated Network (CapWIN)¹. However, this project will not be fully implemented for at least another two to three years.

Throughout recent years, several events have demonstrated the need for greater coordination and cooperation among and between transportation, public safety, and emergency management agencies. One such event was the crash of the Air Florida flight into the Potomac River in 1982, which coincided with a major snowfall and an unrelated Metrorail subway crash to cause major disruption over an extended period. Other events demonstrating the fragility of the transportation network and the need for greater coordination and communication were the so-called “Woodrow Wilson Bridge Jumper” incident, and the crash of a truck carrying highly explosive black (blasting) powder near I-395 in Virginia. Meanwhile, efforts to improve communication and coordination among emergency response agencies were inspired by events such as the Sarin gas attack in the Tokyo subway system in 1996.

2.2 Day of Event

The following table is a brief summary of the events of September 11, 2001 involving the terrorist attack and transportation responses. (A more in-depth chronology is included in Appendix B.)

September 11, 2001

Time	Elapsed Time	Event/Action Taken
8:46 a.m.	[0 hrs. 0 min.]	First plane crashes into the north tower of the World Trade Center (WTC). MDOT activated the Emergency Operations Center (EOC) (between the first and second attacks at the World Trade Center) and readied emergency operations plans. In addition, MDOT directed the Maryland State Highway Administration (SHA) and the Maryland Transportation Authority (MdTA) to keep as many people and as much equipment as possible on the roads.
8:50 a.m.:	[0 hrs. 4 min.]	Metro Transit Police Department (MTPD) telephoned FBI Terrorism Task Force, Washington D.C. Field Office, to determine if any threats had been received for the District of Columbia. The response was negative.
9:03 a.m.:	[0 hrs. 17 min.]	Second plane crashes into south tower of WTC.
9:30 a.m.:	[0 hrs. 44 min.]	President Bush, speaking in Sarasota, Florida, says the country has suffered an “apparent terrorist attack.”
9:40 a.m.:	[0 hrs. 54 min.]	FAA halts all US flights. Metrorail Operations on heightened state of alert.
Soon after 9:40 a.m.:	0 hrs. 54 min.	WMATA Transit Police receive a call from a representative with D.C. Police about a threat to Metro and that closing the system should be considered.
9:43 a.m.:	0 hrs. 57 min.	American Airlines Flight 77 crashes into the Pentagon. Evacuation of building begins immediately. VDOT Statewide Transportation Emergency Operations Center (TEOC) is already in the process of implementing a statewide terrorism alert.

¹The Capital Wireless Integrated Network (CapWIN) project is a partnership between the States of Maryland and Virginia and the District of Columbia to develop an integrated transportation and criminal justice information wireless network. This project will integrate transportation and public safety data and voice communication systems and will be the first multi-state transportation and public safety integrated wireless network in the United States. The project will include image/video transmission and transportation applications in an integrated system. The project will be done in two phases: initial strategic planning phase (year 1) and the implementation phase (years 2 and 3).

Time	Elapsed Time	Event/Action Taken
9:45 a.m.:	[0 hrs. 59 min.]	The White House and the Capitol are evacuated.
9:53 a.m.:	[1 hrs. 7 min.]	Metro Transit Police (MTPD) notified of Pentagon blast.
9:55 a.m.:	[1 hrs. 9 min.]	Metrorail and Metrobus notified that Command Post is established by Chief McDevitt of MTPD. All track maintenance canceled on entire railroad.
9:57 a.m.:	[1 hrs. 11 min.]	President Bush departs from Florida.
10:00 am:	[1 hrs. 14 min.]	America's military put on high alert status. Metrorail Yellow Line trains re-routed to segments of Blue Line still in operation. This effectively closes Yellow Line bridge over Potomac River.
10:10 a.m.:	[1 hrs. 24 min.]	A portion of the Pentagon collapses. United Airlines Flight 93, also hijacked, crashes in Somerset County, Pennsylvania, southeast of Pittsburgh. (Within 30 minutes of the Pentagon attack, the MDOT Washington-area Traffic Operations Center (TOC) supervisor went to the Virginia DOT command center to help coordinate different traffic patterns and to assist otherwise as needed.)
10:22 a.m.:	[1 hrs. 36 min.]	In Washington, the State and Justice departments are evacuated, along with the World Bank.
10:26 a.m.:	[1 hrs. 40 min.]	Metrorail sends first of three empty trains from Rosslyn to Pentagon City for track inspection.
10:30 a.m.:	[1 hrs. 44 min.]	Federal Office of Personnel Management decided that 260,000 federal workers were free to go.
10:32 a.m.:	[1 hrs. 46 min.]	Amtrak, Virginia Railway Express commuter rail, and the Maryland Transit Administration's MARC commuter rail shut down rail service.
10:41 a.m.:	[1 hrs. 55 min.]	Metrorail Blue Line trains run through Pentagon station without stopping.
10:43 a.m.:	[1 hrs. 57 min.]	Report from US Secret Service (through MPD Command Center) that plane hijacked with Metro "hub" as target. No definition of "hub."
10:45 a.m.:	[1 hrs. 59 min.]	Blue Line restored - No station stops at Pentagon and Reagan National Airport stations.
10:46 a.m.:	[2 hrs. 0 min.]	MPD Command Center requests Metrorail to cease operations due to perceived threat. Metrorail determined that threat was not credible and continued operations.
10:59 a.m.:	[2 hrs. 13 min.]	National Airport closed.
11:01 a.m.:	[2 hrs. 15 min.]	Union Station - US Capitol Police report of truck bomb in middle level parking garage. Amtrak Police on scene.
11:05 a.m.:	[2 hrs. 19 min.]	Metrorail notified to run trains through Union Station without station stop.

Time	Elapsed Time	Event/Action Taken
11:29 a.m.:	[2 hrs. 43 min.]	Pentagon Field Command Post reports northbound aircraft traveling at high rate of speed over Potomac River south of the city.
11:31 a.m.:	[2 hrs. 45 min.]	Blue Line train service suspended due to warning of unidentified aircraft. Blue Line trains to keep underground in area of Pentagon.
11:39 a.m.:	[2 hrs. 53 min.]	Arlington County Manager Ron Carlee declared a local state of emergency
11:41 a.m.:	[2 hrs. 55 min.]	Report of Northbound aircraft false alarm - Pentagon Field Command Post.
11:43 a.m.:	[2 hrs. 57 min.]	Service restored to Blue Line.
11:44 a.m.:	[2 hrs. 58 min.]	All above ground trains in Virginia suspended.
12:00 p.m.:	[3 hrs. 14 min.]	Governor Jim Gilmore of Virginia declares a statewide emergency.
12:22 p.m.:	[3 hrs. 36 min.]	State of Maryland EOC established.
12:45 p.m.:	[03 hrs. 59 min.]	Union Station / Amtrak reports partial service restoration to Union Station - one route will open at 1:00 p.m. from Washington to Baltimore only.
1:15 p.m.:	[4 hrs. 29 min.]	The Maryland Transportation Authority states that all facilities are under heightened security and remain open.
1:27 p.m.:	[4 hrs. 41 min.]	A state of emergency is declared by the city of Washington.
2:30 p.m.:	[5 hrs. 44 min.]	The FAA announces there will be no U.S. commercial air traffic until noon EDT Wednesday at the earliest.
4:00 p.m.:	[7 hrs. 14 min.]	Virginia Department of Emergency Management announces that all northbound lanes on I-395 have been closed from the Beltway to Washington, D.C.
6:00 p.m.:	[9 hrs. 14 min.]	Amtrak resumes passenger rail service.
6:30 p.m.:	[9 hrs. 44 min.]	George Washington Memorial Parkway reopened.
6:42 p.m.:	[9 hrs. 56 min.]	Roadway traffic is slowly returning to normal. U.S. Park Police have reopened the southbound GW Parkway and traffic on the Clara Barton and Rock Creek parkways is now moving in both directions. Constitution Avenue between 15th and 17th streets as well as 15th Street at Constitution Avenue have been closed. Traffic in the District has cleared up but a few areas in the Northwest are blocked off. Northbound I-395 is closed as well. Traffic signals in D.C. have been reprogrammed to the afternoon rush hour cycle. Pentagon and National Airport Metro stations are closed.
7:09 p.m.:	[10 hrs. 23 min.]	Normal Metrorail service restored. No station stops at Pentagon and National Airport stations.
7:15 p.m.:	[10 hrs. 29 min.]	Yellow Line bridge service restored.
7:20 p.m.:	[10 hrs. 34 min.]	WMATA Command Center secured.
9:22 p.m.:	[13 hrs. 36 min.]	CNN's McIntyre reports the fire at the Pentagon is still burning and is considered contained but not under control.

Operational Decisions and Impacts

Northern Virginia

VDOT was at “normal peacetime” readiness on September 11, and a routine rush hour in Northern Virginia was just drawing to a close as the first airliners crashed into the World Trade Center towers in New York. First reports of terrorist attacks in New York came via the media and TRANSCOM. (TRANSCOM, an inter-agency consortium, provides information-sharing and other services to transportation agencies in the New York metropolitan region.) Awareness of the attacks led to mobilization according to set protocols, which in turn led to quick, specific actions by territory and need. The statewide Transportation Emergency Operations Center (TEOC) was in the process of implementing a statewide terrorism alert via the Virginia Operational Information System (VOIS) in response to the New York events when the third aircraft flew directly over the Smart Traffic Center (STC) in Northern Virginia just before hitting the Pentagon. With this impact, VDOT went to the highest state of readiness, and responded to the incident by invoked existing emergency plans, activating its Statewide TEOC, and implementing disaster response protocols at the Northern Virginia STC.

VDOT’s emergency plans are based on the “All Hazards” principle, thus being appropriate for a variety of circumstances. The TEOC was augmented to full staffing levels and coordinated statewide information and activities throughout the event. The TEOC also assured adequate flow of information to the State EOC and the Governor’s office.

Pre-existing contingency plans were immediately consulted by the STC staff, and were useful at the traffic operations level. However, the scope of events on September 11 significantly exceeded the scope of existing plans, which focus on traffic management issues, not national security and possible multiple threats to infrastructure.

The Pentagon is located in Arlington County and is served by the Arlington Fire Department. Because of a prior formal agreement, the department assumed incident command. By mid-morning more than 270 Arlington firefighters and emergency medical services personnel were fighting the fire, rescuing trapped victims, and treating or transporting the injured. Each of the County’s 10 fire stations was “backfilled” with equipment and personnel from neighboring jurisdictions, through automatic mutual aid agreements. The Arlington Police Department, with every officer that could be spared from regular patrol, also had a heavy presence performing traffic and crowd control as well as securing the perimeter.

By 9:53 a.m., Arlington’s Emergency Operations Center (EOC), which coordinates all of the County’s disaster response efforts, was activated, and employees on the County’s emergency response teams made their way to the center. Less than two hours later at 11:39 a.m., County Manager Ron Carlee declared a local state of emergency. This allowed the County to submit a

request to FEMA through the state of Virginia, which in turn permitted urban search and rescue teams from Fairfax County, Va.; Montgomery County, Md.; and Hampton-Roads, Va., to enter Arlington to assist in the rescue operation. The County Board ratified the declaration later that day.²

The Northern Virginia STC immediately made itself available to the military as a command post for dealing with the Pentagon incident. The military used the STC as a joint command post for the duration of the incident. The Northern Virginia District of VDOT augmented STC, Safety Service Patrol (SSP), and traffic control assets to facilitate clearance of the D.C. area. Signal coordination, suspension of construction lane closures statewide, and reversing and opening of high occupancy vehicle (HOV) lanes in the outbound direction were immediately implemented.

VDOT provided essential rescue and recovery equipment requested by authorities at the Pentagon incident site in a rapid and effective way. Equipment included 21 sets of portable lights to facilitate rescue work through the night at the Pentagon. Tiger teams from Culpeper District in Western Virginia were deployed to assist the Northern Virginia District with coping with effects of incidents. (Tiger teams are VDOT crewmembers who are deployed to regions in the state that need additional assistance in preparing for and responding to severe weather events or any other emergencies involving the roads and highways.) VDOT's representative to the Governor's Terrorism Task Force met with other members of the Task Force to provide transportation input to actions recommended to the Governor.

There was no communication to VDOT from agencies in D.C., including the National Park Service and DDOT, regarding transportation facility closures that affected traffic volumes at entry points into Virginia, although there were requests for information from the District Division of Transportation. VDOT was in a reactive mode because of this lack of communication. VDOT plans lacked provisions for significant levels of inter-agency coordination. For example, there was no communication between the VDOT center in Northern Virginia responsible for traffic operations in the area and WMATA, the region's transit provider. Thus, in Northern Virginia, the local STC reversed HOV lanes to facilitate movement of southbound traffic out of the District. Unfortunately, this action precluded the use of these facilities as a route for Metrobuses to return to the District to pick up more transit-dependent travelers.

¹ *Pentagon Attack Puts Arlington to Test*, by Pamela A. Locke PA TIMES Archives; The American Society for Public Administration; Vol. 24 - No. 11, November 2001

Maryland

In Maryland, the first concern was to make sure there were no imminent threats to infrastructure and to secure the bridges, tunnels, and miles of roadway against future threats. The next concern was to support efforts to get people out of downtown Washington, Baltimore, and Annapolis as well as away from government facilities, and to get them home safely within a narrow timeframe. Although there was near-gridlock as many employers (including the Federal and state governments) allowed employees to leave due to the uncertainty about the nature and extent of events, there were no formal evacuations.

MDOT and its agency representatives immediately headed to Maryland Emergency Management Agency (MEMA) headquarters at Camp Fretterd in Woodensburg, Baltimore County to coordinate activities statewide and respond to the needs of various agencies and jurisdictions according to protocols. MDOT activated their EOC between the first and second attacks on the World Trade Center and readied their emergency operations plans. In addition, MDOT directed the Maryland State Highway Administration (SHA) and the Maryland Transportation Authority (MdTA) to keep as many people and as much equipment as possible on the roads. This was the operational cornerstone of MDOT's response. They were also told to move stranded or abandoned vehicles, especially under bridges because of concern about bombs.

Maryland transportation authorities implemented a number of specific actions statewide in response to the situation. Surveillance under bridges began, and SHA district engineers were immediately directed to provide regular patrols of high-risk structures (above and below) using maintenance forces. District engineers were also directed to report any "suspicious" activities to the Maryland State Police (MSP) and the EOC. The next day, SHA dispatched bridge inspectors to high-risk bridges to observe the piers and substructures visually for any foreign objects or any other irregularities. These inspections are now part of their routine duties. MdTA also began inspections of its structures, including highways, land bridges, and overpasses, as well as bridges over water and tunnels. Routine inspections and random patrols for suspicious vehicles are continuing by police, vehicle recovery patrols, and boat. All video surveillance cameras at high-profile locations, including major bridges and tunnels, were activated and monitored.

Suspicious or abandoned vehicles were also removed from the roadway. MdTA began towing any vehicles around bridges, tunnels, and toll plazas, and on the highway generally, on an immediate basis, as opposed to their usual 12-hour policy. SHA called the MSP to investigate abandoned vehicles before it began towing, though it did so on a more urgent basis. Several days later, parking was banned underneath bridges.

All construction work zones involving lane closures were terminated. State

troopers and MdTA Police worked on clearing fender-benders and disabled vehicles more aggressively. Physical barriers were placed in front of facilities that housed command centers, and heightened security measures were instituted at all facilities. The Motor Carrier Division, in conjunction with close cooperation of the MSP and at the request of the Federal Motor Carrier Safety Administration, stepped up vehicle inspections with special emphasis on hazardous materials loads and drivers. Escorts, when needed, were provided by MSP and MdTA police.

SHA rendered assistance to the National Security Agency (NSA) when non-essential personnel were evacuated. SHA sent a technician to manually reset and operate the traffic lights to improve flows. In addition, traffic was rerouted around Andrews Air Force Base so that access was available at only one entrance at the front of the base and at one toward the back. The next day, SHA provided concrete barriers at several of these installations as security was heightened and access limited to these facilities. To date, approximately one mile of Jersey barrier has been moved by forklift, front-end loaders, and trucks to provide physical barrier to high-security and other state and Federal Government locations.

Considerable SHA activities over the next days were focused on the backups that resulted. A 7 to 10 mile back up existed the next day because of the

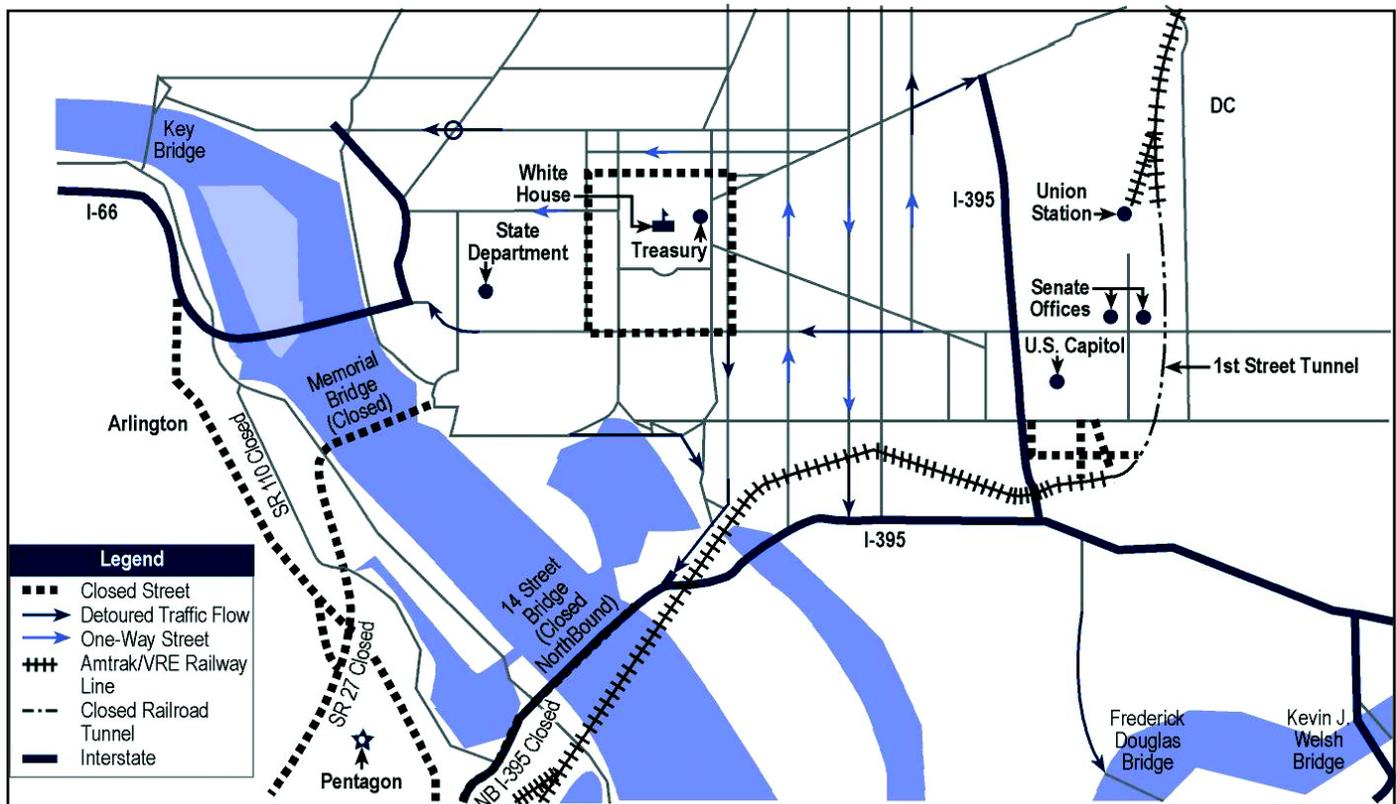


Figure 7. Transportation Facility Closings on September 11, 2001

security checks for vehicles entering the NSA installation. Delays at this entrance and at gates to Fort Meade continued for several days, but dissipated over time with better coordination and traffic control improvements.

Washington, D.C.

In Washington, D.C., traffic into the city was detoured, as Washington declared a state of emergency. Ramps were closed from interstates and variable message signs (VMS) alerted motorists to avoid the area. Retiming traffic signals for very heavy peak-period outbound traffic facilitated traffic flow out of Washington. The same was done in suburban Montgomery County, which, under prior agreement, controls signals on the state system that are located within the county. HOV restrictions were removed, and overhead sign changes, travelers advisory radio (TAR), and the media alerted motorists to changes in traffic patterns.

The District of Columbia Division of Transportation (DDOT), which is part of the District's Department of Public Works, received word of the attack from outside the Division; DDOT did not have any provision for ongoing monitoring of news outlets. The D.C. signal system was changed to "PM mode" at around 10:30 AM. Because of limitations imposed by the D.C. traffic signal system architecture, it was impossible to make changes to the signal system all at once. Instead, signal engineers had to deal with discrete geographic segments of the city, or "bubbles." The system had to be changed "one 'bubble' at a time." Re-timing of the signal system was complete by about 11:30 AM. DDOT contacted the Northern Virginia STC from the D.C. Emergency Management Agency (DCEMA) Command Center to check on the status of Northern Virginia roads. DDOT staff asked about the feasibility of making I-66 outbound-only for evacuation, but they were told that this was not possible.

The Secret Service contributed to downtown traffic problems by expanding the White House perimeter and closing streets in an area bounded by Constitution Avenue on the south, H Street on the north, and between 14th and 18th Streets NW. As quickly as possible, DDOT deployed portable VMS signs and traffic cones to redirect traffic away from street closings. As in many other jurisdictions, rumor control was a significant problem; erroneous reports about the transportation system status (including reports that Metrorail had closed) had to be verified or discounted.

The Washington Metropolitan Area Transit Authority (WMATA) reported that Metrorail's ridership was 445,038 between opening and 6 p.m. on September 11, about 40,000 fewer rides than the previous Tuesday. Figures 8 and 9 indicate the number of entries and exits at stations in the Metrorail system on representative days in September 2001. The ridership pattern for September 11 departs radically from the normal pattern of ridership peaking in the morning and evening rush hour. Instead, just as the morning rush hour is subsiding, passenger traffic suddenly "spikes" again as workers self-evacuated

from the central business district.

WMATA closed its stations at the Pentagon and Reagan National Airport, and rerouted the Yellow Line away from the bridge across the Potomac River. After the Pentagon was struck, WMATA sent engineers to assess the structural integrity of the Pentagon Station. WMATA also provided buses to help transport those injured at the Pentagon to area hospitals, and provided several Metrobuses to assist D.C. Metropolitan Police in moving personnel to various locations throughout the District.

Even before the attack on the Pentagon on September 11, WMATA had set up a special command center following the attacks in New York, which monitored operations closely and remained open for much of the day, according to the chief safety officer of WMATA. The command center kept in close contact with the FBI, fire departments, and other law enforcement agencies in the region. The center heightened system surveillance, alerted tactical police, and sent bomb-sniffing dogs to find suspected explosives at stations, noting that WMATA had received tips of three suspicious packages seen in the system. Certain Metrorail station entrances were closed, and buses were delivered to areas where they were needed.

WMATA has prepared to deal with this type of emergency through drills, spot checks, and frequent training. Emergency preparedness is an important priority at WMATA, because Washington is considered by WMATA security personnel to be a "ground zero," a prime target for terrorist attacks. The agency assumes the issue of attacks on the nation's capital is a matter of "when" rather than "if."

In Montgomery County, mid-day traffic flows were reportedly equivalent to evening rush hour volumes. "Evening rush hour" peaks were reached at about 1:15 PM in the county. In the District, traffic snarls in the K Street corridor, the

Metrorail Passenger Entries

September 2001

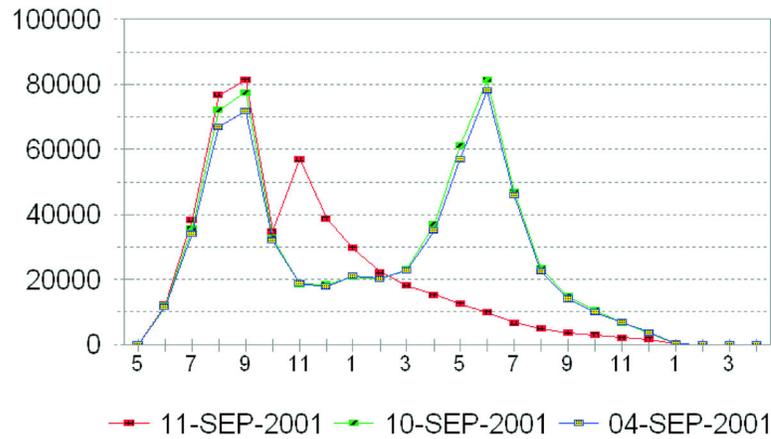


Figure 8. Metrorail Passenger Entries by Hour, September 2001

Metrorail Passenger Exits

September 2001

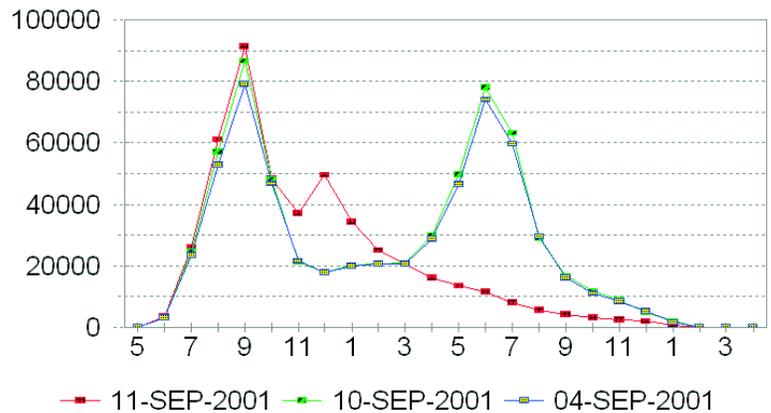


Figure 9. Metrorail Passenger Exits by Hour, September 2001

Daily Website Activity

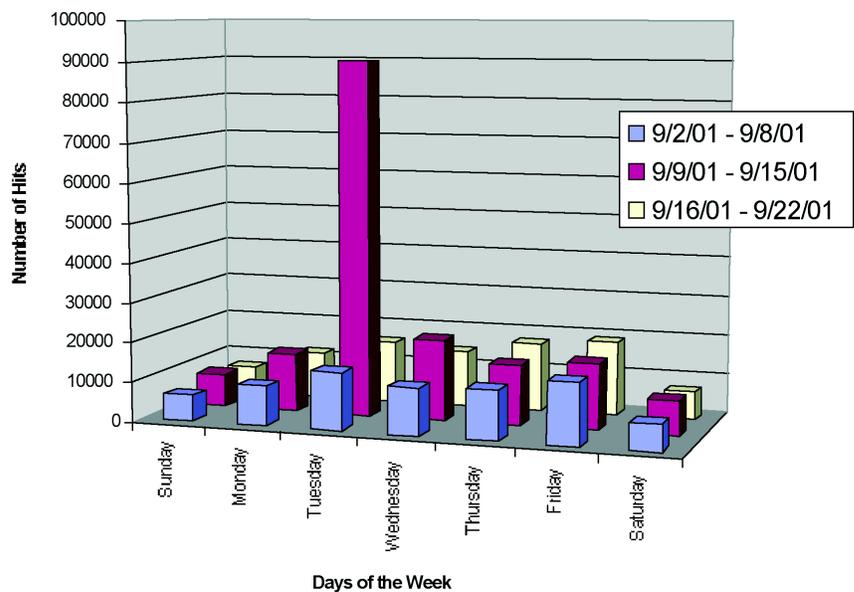


Figure 10. “Hits” on Montgomery County, MD Traveler Information Website

most congested location in the city, were not resolved until about 2:45 PM. DDOT engineers reported that, even though they had changed over the signal system to accommodate an outbound “rush hour,” about 20 percent of the traffic was trying to move counter to the planned flow. Even so, DDOT staff estimated that the use of the computerized signal control system probably reduced by at least an hour the time needed to complete the self-evacuation of the District.

Traveler information was also valued highly during the crisis. Local and state government traveler information Web sites saw a significant spike in activity, as shown in the figure below. Here, Web “hits” (a proxy for the number of requests for information) for the Montgomery County traveler information site during the first three weeks of September 2001 clearly show the increase in demand for information about street closings, the status of transit service, and travel advisories.

Traffic Impacts: Travel Time and Congestion

Limited information is available about the impacts of the operational actions of transportation agencies on traffic conditions on September 11, 2001. However, information derived from the region’s Advanced Traveler Information system after the fact provides an indication of how travel was affected. This information is of limited practical utility, due to the indirect nature of data collection and due to frequent (if temporary) failures of the traffic information servers due to heavy demand on September 11. However, the information is indicative of what travelers may have experienced on that date.

A preliminary analysis was done by Mitretek based on the HOWLATE methodology using travel time data archived from the SmarTraveler web site for September 11, 2001. On any given day SmarTraveler reports travel time information on 33 facilities Washington, D.C., which is archived every five minutes from 6:30 AM to 6:30 PM by Mitretek Systems. Thus, there are 4785 (145 x 33) archived travel time reports for each day. On September 11, 2001, SmarTraveler did not report travel time information for a total of 296 records (6%), between 11:40 AM and 3:25 PM. The impacts on a commuter on this day were compared to results from a previous study conducted to evaluate the benefits of pre-trip ATIS in Washington, D.C. for the period from June 1, 2000 to May 31, 2001 (*"On-Time Reliability Impacts of Advanced Traveler Information Services (ATIS), Volume II," Draft Report, Prepared by Mitretek Systems for FHWA, Oct 2001.*). The performance was examined only for the period between 9:30 AM to 6:30 PM, since this was the period immediately following the incident.

When compared to a typical day, on September 11, 2001, a commuter experienced:

- ◆ An increase in stress by more than a third
- ◆ More than triple the risk of being late than normal
- ◆ More than 3 times the increase in late schedule delay
- ◆ 26% reduction in just-in-time reliability
- ◆ 11% increase in early schedule delay
- ◆ Nominal increases in travel time (increase of 0.9%), average delay (3%) and travel expenditure (2.4%).

Figure 11 illustrates the impact on commuter travel time for the period from 9:30 AM to 6:30 PM. The figure shows the percentage increase in travel time from normal for trips originating from the colored regions. For example, in Downtown D.C., trips starting from regions colored red experienced a 10-15% increase in travel time from normal. It is clear from the figure that majority of the impact was felt by commuters leaving D.C. (See Appendix 4.)

2.3 Post- Event

In the Washington metropolitan area, congestion around federal facilities and military bases caused by vehicle inspections and the closing of entrances has continued to present transportation-related problems. These problems range from relatively minor closures and restrictions, such as the street closings near the White House and truck restrictions around the Capitol, to significant issues such as the closure of a major commuter route that passes through a Northern Virginia military base. Delay due to security screening has presented such problems for military base operators that some have asked for roadway improvements on routes leading to the bases, including expansion of MD 175 adjacent to Ft. Meade.

WMATA made several changes in response to the events of September 11. A structural assessment of the Pentagon station was completed by mid-day on the 11th, and service to the Pentagon for employees started the next day. The new Pentagon bus terminal and transfer facility was completed and opened for business on December 16, 2001, restoring full service to the Pentagon and eliminating the temporary transfer facility at Pentagon City.

However, heightened security continued to cause problems for transit and highway operations alike. In Northern Virginia, Metrobus routes were turned back at the main gate of Fort Myer; detours were also put in place at Fort Belvoir and Bolling AFB. Metrobuses were also prohibited from the grounds of the National Institutes of Health (NIH) in Montgomery County, and detours were put in place to provide continued access to the Medical Center Metro station adjacent to NIH. Increased base security at the National Security Agency on Fort Meade in Anne Arundel County, Maryland caused traffic to spill back to the Baltimore-Washington Parkway. Observing the backups on their traffic surveillance cameras, Maryland highway officials contacted base personnel and worked with them to design a traffic pattern that eased spill back problems. Similarly, DDOT traffic engineers worked with staff at Walter

Percentage Increase in Travel Time from the Average for the Year, Sept. 11, 2001

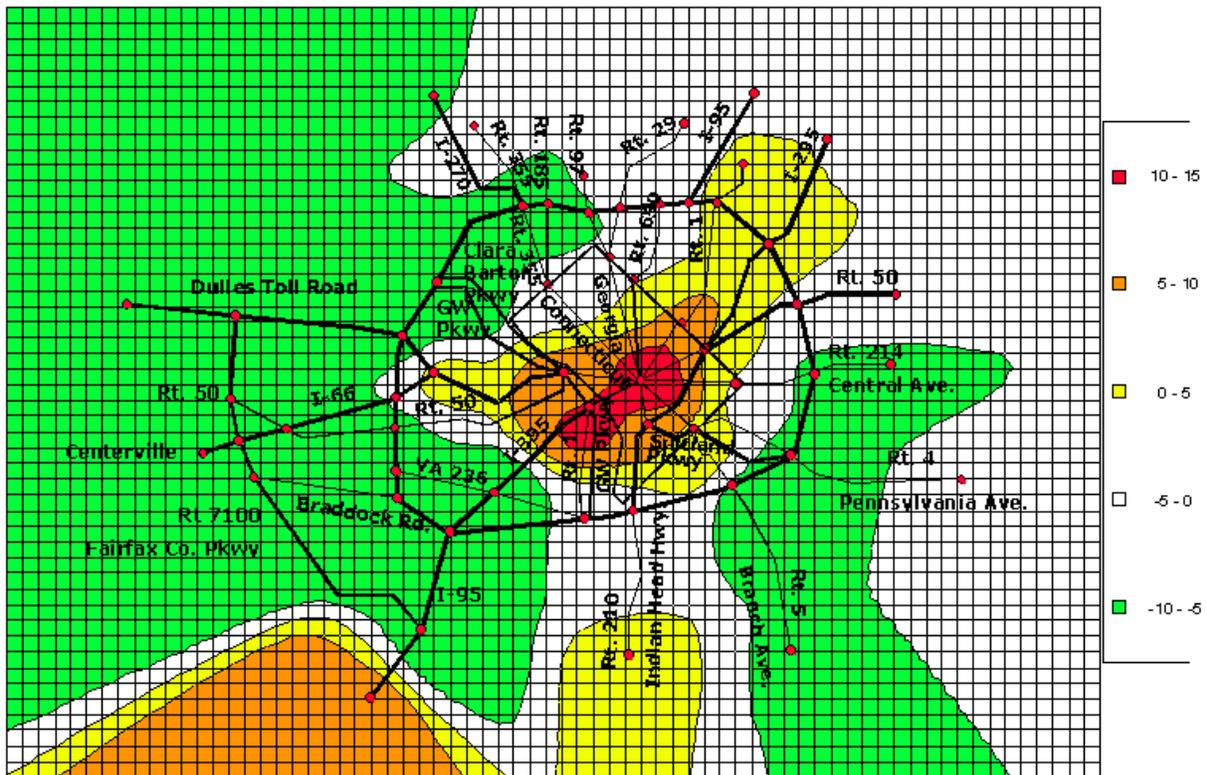


Figure 11. Percent Increase in Travel Times on September 11, 2001

Reed Army Medical Center to mitigate traffic problems. Portable variable message signs were used to advise commuters about changing traffic patterns at these security choke points.

The consensus among the region's transportation officials was that the events of September 11 have spurred interest in improved coordination and cooperation; in greater application of advanced technology for operations, system management, and security enhancement, and in improved preparation for emergency response, including evacuation procedures and emergency support functions. Through the leadership of the National Capital Region Transportation Planning Board and the Washington Metropolitan Council of Governments (WashCOG), the region's transportation, public safety, and emergency management agencies are establishing plans and procedures that will enhance their capability to respond to future crises.

Transportation agencies have experienced mixed results in terms of travel demand and ridership levels following the events of September 11 and subsequent terrorist acts, security alerts, hoaxes, and scares. Complicating the recovery of the transportation system has been the anthrax attack on various agencies and institutions of the Federal Government. A series of letters containing anthrax powders were received by news media figures in Florida and New York, and a highly potent form of anthrax was sent to the offices of Senate leader Tom Daschle. This precipitated the closure of the Hart Senate Office Building and several mail handling facilities, and heightened concern on the part of many commuters. Metrorail patronage, which had started to recover after September 11, dropped off again after the anthrax scares. Since then, while Metrobus ridership has begun to rise and peak period ridership on Metrorail is approaching normal levels, discretionary off-peak travel on Metrorail is substantially lower than pre-9-11 levels.

3.0 Findings

3.1 Planning and Preparedness by Individual Agencies

Emergency planning before September 11 was generally performed by individual jurisdictions, with minimal regional coordination. The greatest obstacle to effective response on September 11 was a breakdown in collective control; there was no effective coordination of command, control, and communication. Individual agencies did a good job, but there was no synergy among agencies or across jurisdictional lines. Transportation agencies, unlike public safety agencies, have no habit or venue for operations staff to consult or inform one another about decisions. Planning for a response to events was also complicated by the lack of coordination and communication from federal agencies acting unilaterally, with actions ranging from uncoordinated early release of employees to closing of streets and imposition of heightened security checks.

With the attack on the Pentagon, VDOT immediately went to the highest state of readiness and responded to the incident by invoking existing “all-hazards” emergency plans, activating its Statewide TEOC, and implementing disaster response protocols at the Northern Virginia STC. Plans were consulted immediately and were useful; however, the scope of the situation on September 11 significantly exceeded the scope of existing plans, which focus on traffic management issues, not national security.

The events of September 11 exposed gaps in STC emergency plans and protocols. As of that date, there was no plan in place to provide continuity of operations should the STC be damaged or destroyed. In addition, VDOT lacked interoperability guidelines for contact and interaction with the military. VDOT also recognized a need to establish a protocol for obtaining additional resources from within the Northern Virginia District and from neighboring operating Districts.

In Maryland, the primary reason for success on September 11 was that they put a large number of people in the field immediately; however, this is not sustainable in the long run. MDOT and SHA have identified the need for technology to relieve labor-intensive security duties. (It is worth noting that a presenter at the Critical Infrastructure Protection workshop at the 2002 TRB Annual Meeting estimated the annual cost of provision of a single security guard, 24/7/365, at \$159,000 a year.) Agencies need staffing in depth so that they can ensure 24/7/365 coverage at operations centers and in the field.

The chief technology officer for Washington, D.C. said that, “Y2K preparation was tremendous,” and added that emergency plans had been practiced “many times.” This practice helped people stay calm and organized. According to this source, September 11 “looked very methodical, very workman-like, very even-tempered.”

3.2 Institutional Coordination

A knowledgeable observer of the events in the metropolitan Washington, D.C. area on September 11, 2001 noted that each agency acted professionally, capably, and responsively, to perform its duties as it saw them. However, there was little if any coordination on decisions relating to management and operation of the transportation network among and between jurisdictions.

Coordination between transportation agencies and their counterparts in public safety and law enforcement was generally good, with the exception of federal agencies in the District of Columbia. The failure to coordinate the release of federal employees, and the lack of notification regarding the intent to release employees, caused an unanticipated rush of commuters just as the region's transportation network was winding down from the morning peak period service pattern. In addition, unilateral action, without notification, by agencies closing D.C. streets in the vicinity of critical governmental facilities complicated efforts to accommodate the early rush of commuters.

3.3 Communications

Telephones were the main communications technology used on September 11 at Washington, D.C.'s command center, housed in the Reeves Center in Northwest. But when circuits jammed on the East Coast, the center switched to cellular devices and global satellite phones, instant messaging available through Yahoo!, and e-mail. "By 10 a.m. [Sept. 11], 13,000 e-mails had passed," according to D.C.'s chief technology officer, before the District shut down its government offices. She said about 20,000 e-mail messages pass through the system in a typical day.

Shortcomings in the Virginia Statewide TEOC procedures were also noted in after-action critiques. The TEOC was unable to contact Northern Virginia STC by voice communications immediately after the Pentagon attack due to telephone landline and cellular phone problems. VDOT was challenged to process the heavy volume of often-conflicting information received in the TEOC. One form of communication that was effective in every jurisdiction was the "direct connect" radio telephone communication offered in the Washington, D.C. region by Nextel. Direct connect service was available throughout the event.

In Montgomery County, Md., the County's telecommunications chief said that the emergency operations center, or "crisis center," was established shortly after the attacks as a support for local governments. The center, located at the county office building, had a complete radio room that could dispatch police, fire, and emergency personnel, and have contact with area hospitals. The county also recently installed an 800 MHz radio system with two-way radios for County public safety agencies. The new radio system is not yet in use. As of March 2002, it was about 90% built and will be undergoing test and cutover

later in 2002. It will service county agencies (police, fire including volunteers, public works) as well as municipal police departments within Montgomery County (Rockville, Takoma Park, and Gaithersburg). Some neighboring jurisdictions that have similar systems will be included by the use of "talk groups." Others, such as Prince George's County, whose systems are not compatible, can be linked (patched) to Montgomery County's system at the Emergency Communications Center.

To help with calls from residents, 12 telephone lines were added to the 15 to 20 already in the crisis center. Wireless phones and two-way pager systems, which allowed people to send e-mails, also were available. The center had 25 laptop computers connected to a local-area network and with e-mail access. "We did use e-mail extensively," said the County's technology chief, adding that officials sent general e-mail messages Sept. 11 and Sept. 12 alerting county employees about whether the government would be open.

Rumor control was a real problem in Virginia on September 11. Bridges and roadways were closed when rumors of bombs abounded. Word also got around that the Metrorail service had been shut down, when in fact only the Pentagon and National Airport stations had been closed. This rumor, however, kept many people out of the subway and instead on the streets, heading home on foot.

MDOT also experienced problems with the reliability of information. There was a fair amount of information, particularly disseminated by the media, which turned out to be false. It was initially difficult to get accurate information and this could ultimately affect deployment of resources. For example, it was difficult to get verification about a possible airplane crash at Camp David, located in Frederick County, Md.

Similarly, reports were coming out via the media of terrorist threats against eleven sites in Maryland, including the State House, Baltimore's World Trade Center, and the Naval Academy. The Governor was evacuated from Annapolis, State Circle in Annapolis was closed, and non-essential personnel were told to leave state offices. This hoax diverted a lot of attention of the Maryland State Police and other police authorities and caused severe traffic congestion in the Baltimore metropolitan region as various transportation facilities were closed or severely restricted in their availability.

From the morning of September 11, the Metropolitan Washington COG and the Federal Government were involved in hourly conversations and briefings about the situation. However, these conversations generally did not extend to the transportation response to the events surrounding the attack, and coordination of transportation operations remained haphazard.

3.4 Operating Decisions

While facilitating the movement of people away from the District of Columbia was one of the higher priorities, control over roadways in the vicinity of the Pentagon and facilitation of the movement of emergency personnel and equipment was even more important. Northbound I-395 (Shirley Highway) was closed at the Capital Beltway, and several roadways near the Pentagon were shut down. While the lifting of HOV restrictions was a debatable strategy, the intent was to maximize available vehicular capacity.

VDOT took a variety of actions to handle the unexpected demand on the transportation system and to get people out of Washington and away from the Pentagon. These actions included:

1. Signal system timing was reset for heavy P.M. rush
2. Signals were adjusted to facilitate emergency responders en-route to Pentagon
3. Ramp meters also reset for heavy P.M. rush (but became a non-issue as they are only located on routes that were quickly closed to non-emergency vehicles)
4. Variable Message Sign message menu required very little adjustment to accommodate notices about avoiding the District of Columbia and the Pentagon area
5. HOV lanes were immediately opened to all traffic
6. Highway Advisory Radio (HAR) messages were adjusted
7. Construction work zone lane closures were suspended
8. Frequent updates to broadcast media for use on local radio/TV were provided.

It is difficult, if not impossible, to accurately measure the effects of VDOT's management approach to the events of September 11 due to a lack of data regarding volumes and speeds on affected roadways. VDOT officials at the SMART Traffic Center and at the Northern Virginia District responsible for managing the region's traffic network and signal systems reacted decisively to mitigate the effects of the road closures and the mass exodus of federal staff from DC resulting from the attack on the Pentagon. During the course of the morning and early afternoon, VDOT monitored the effects of its actions with reports from the field and via imagery from its CCTV system. Unfortunately, it is now impossible to ascertain the effects of road closures on parallel arterials, for example, due to the incomplete nature of traffic data. Volume, speed, and occupancy data from the signal system in Northern Virginia covers a large percentage of the intersections in the region. However, data coverage is not sufficiently complete in those areas of interest for an accurate quantitative analysis of VDOT's actions.

Maryland SHA dispatched the Washington-area TOC supervisor to the STC within 30 minutes of the Pentagon attack to help coordinate different traffic patterns and to assist otherwise as needed. MDOT also sent three VMSs to Virginia to assist with road and ramp closures.

In the Baltimore, Md. area, I-83 (John F. Kennedy Expressway) south into the City of Baltimore was closed, restricting access into the city to local roadways. All roads accessing BWI airport were closed, and, traffic permitting, two of the four bores of the Ft. McHenry Tunnel were closed for tighter security.

Meanwhile, MDOT took action to manage changes in traffic flow due to heightened security at military and national security installations. There is a wide range of facilities within this category, including those pertaining to national security and public health, major military installations, National Guard, State Police, and so on. Ramps from parkways to security agencies were closed. These were later reopened with limited access to the facility via only one gate. All area military installations closed secondary gates.

Montgomery County, adjacent to Washington, maintains and operates traffic signals on state roads within county limits. Its entire system was activated as though it was a very heavy evening peak period immediately upon hearing of the terrorist incidents. The unrestricted outbound movement so early in the mass exodus from Washington went far in preventing major regional gridlock. Montgomery County also provided NIH with six VMS to help manage traffic flows.

Although there are reversible flow lanes on two major outbound routes, they were not used because they are regulated by both static signs noting hours of use and over the road, changeable signs. There was concern that the static signs would cause confusion. The replacement of static signs with changeable ones would permit using the reversible lanes in the event of evacuation.

3.5 Role of Advanced Technology

ITS technologies employed in Virginia included: the advanced traffic management center (the STC), VMS, detectors and CCTV. According to VDOT, imagery from CCTV network was extremely useful. Real-time imagery aided in assessing the progress and effect of traffic management operations. However, as indicated by many other interviewees, VDOT personnel perceived the telephone as one of the most important items of technology in use on September 11.

Maryland made use of many of the same technologies, finding CCTV surveillance of particular utility. Dynamic message signs and highway advisory radio were used for traveler information, along with websites advising travelers of road closings and transit disruptions.

In Washington, D.C. and in neighboring Montgomery County, computerized traffic signal systems enabled these jurisdictions to handle the “early rush hour”

as commuters self-evacuated from the District. Montgomery County in particular made effective use of traffic surveillance systems, which were largely unavailable in the District. The District did make use of a number of portable VMS units, but is unable to say how effective the devices proved to be.

Technologies used or available at the DCEMA control center and the DDOT command center included:

- ◆ Scrolled running commentary displayed on large screens.
- ◆ Posting “sterile images” of video that, for example, would show real-time situations at bridges.
- ◆ A situation reporting system that keeps track of incidents.
- ◆ An emergency alert system to broadcast real-time messages and scroll them across cable TV systems. (The system was not used during September 11, largely because there was no agreement on what the message should be.)
- ◆ A video link to Virginia Department of Transportation bridges and gateways.
- ◆ Full traffic control and intersection control of the District’s 1,500 traffic quadrants.

3.6 Redundancy and Resiliency

The head of Maryland DOT’s Office of Engineering and Procurement and the Department’s Emergency Response Manager, noted that a major lesson learned from September 11 is the need for redundant systems to ensure continuity of operations. Maryland is considering alternative Traffic Operations Centers, communications systems, and other systems.

The Executive Director of the TPB made a similar point, arguing that one of the critical needs exposed by the events of September 11 is the need for a truly fail-safe communications, command and control system. Systems depending upon cellular telephones, and even some landlines, were unreliable. Although some agencies had satellite phones, they often were not in the hands of the people who needed them.

WMATA staff also stressed the need for redundancy and resiliency. In terms of command and control, they pointed out the need for preservation of the “brain trust” of Metrorail and Metrobus operations, by distributing the senior managers among different sites. Also noted was the need for updated recovery plans for information technology systems, and the need for a back-up Multidisciplinary Command Center (MCC) – probably at the end of one of the rail lines, to supplement the centrally located MCC. In terms of operations, the

WMATA Deputy General Manager for Operations pointed out that there was a need for rethinking Metrorail operations in the face of increasing ridership and threats to the Metrorail infrastructure.

In the end, a crucial element is greater capacity, both on bus and on rail. On Metrorail, additional track capacity is required downtown. Metrorail wants "another downtown pipe," as well as another Potomac River crossing. Additional capacity is crucial to continuity of operations; if Metro were able to guarantee continued service in the event that part of the system were to be damaged, potential threats to the system would be lessened. Existing contingency plans to get the federal workforce into the city are marginal. Historically, the idea was to engineer reliability into equipment to ensure continued operation; thinking has to change after September 11, so that planners build redundancy, flexibility, and interconnectivity into the system.

4.0 Conclusion

Among the needs raised by the problems with interagency and interjurisdictional coordination are:

1. Transportation incident/emergency management and response personnel must consider how to address catastrophic events that involve evacuation of large numbers of people as well as incidents involving traffic mobility and congestion, including the possibility that the event itself has disrupted or shut down a major portion of the transportation system.
2. A more carefully conceived communication system and a set of protocols need to be designed and implemented, enabling real-time exchange of messages and information directly between transportation personnel, respondents at the scene of an incident, and personnel from other involved agencies. Such coordinated communication is critical to insure appropriate incident/emergency response and management.
3. Lines of authority among persons and institutions need to be more clearly delineated and adopted for future use to expedite recovery, to avoid increasing risks, and to make the best use of limited resources.
4. Emergency management planning needs to be better coordinated between neighboring political jurisdictions.
5. Media contacts should be established and a single message should be agreed upon by operating agencies with respect to the overall response to a crisis. The term used in the Capital Region is "many voices, one message;" media liaison officers should coordinate to assure consistency and to make certain that inaccurate information is squelched as quickly as possible.

In September 2001, the Executive Session on Domestic Preparedness (ESDP) issued a paper titled, "An Overview of Incident Management Systems." The ESDP, a standing task force of specialists in terrorism and emergency preparedness sponsored by the Kennedy School at Harvard University and the U.S. Department of Justice, produced the report as part of their series on *Perspectives on Preparedness*. In the report, the authors note that,

When coping with a natural disaster, wildfire or disease outbreak, numerous agencies at the local, state, and federal levels have to effectively communicate, coordinate operations, and allocate resources. This is equally true in the event of a serious terrorist attack. How can personnel and organizations that do not normally work together do this effectively? One solution to the potential problems of divided leadership, parallel chains of command, operational conflicts, competing resource demands, and unfamiliar professional terminology is an Incident Management System (IMS), which is designed to manage complex or multisite emergency events.... IMS is a generic term for the design of ad hoc emergency management teams that coordinate the efforts of

more than one agency under a unified command. It is a functionally based organizational template that facilitates information flow, decision-making, and operational coordination. The basic idea is that an incident commander or a unified command team is responsible for the successful resolution of the emergency through a process of authority delegation and coordination among many participating agencies. IMS emphasizes joint problem solving to meet the needs of the emergency situation. What makes the system distinctive is that it creates a clear chain of authority that can quickly orchestrate collaborative operations by diverse organizations that have had little or no previous operational relationships.

The IMS (also known as the Incident Command System, or ICS) represents a possible solution to many of the problems experienced in coordinating transportation actions in the event of a natural or manmade disaster. In fact, elements of an ICS were invoked to some extent by public safety agencies in responding to the Pentagon attack, but there is much room for improvement.

Interim Incident Communications Process for the National Capital Area

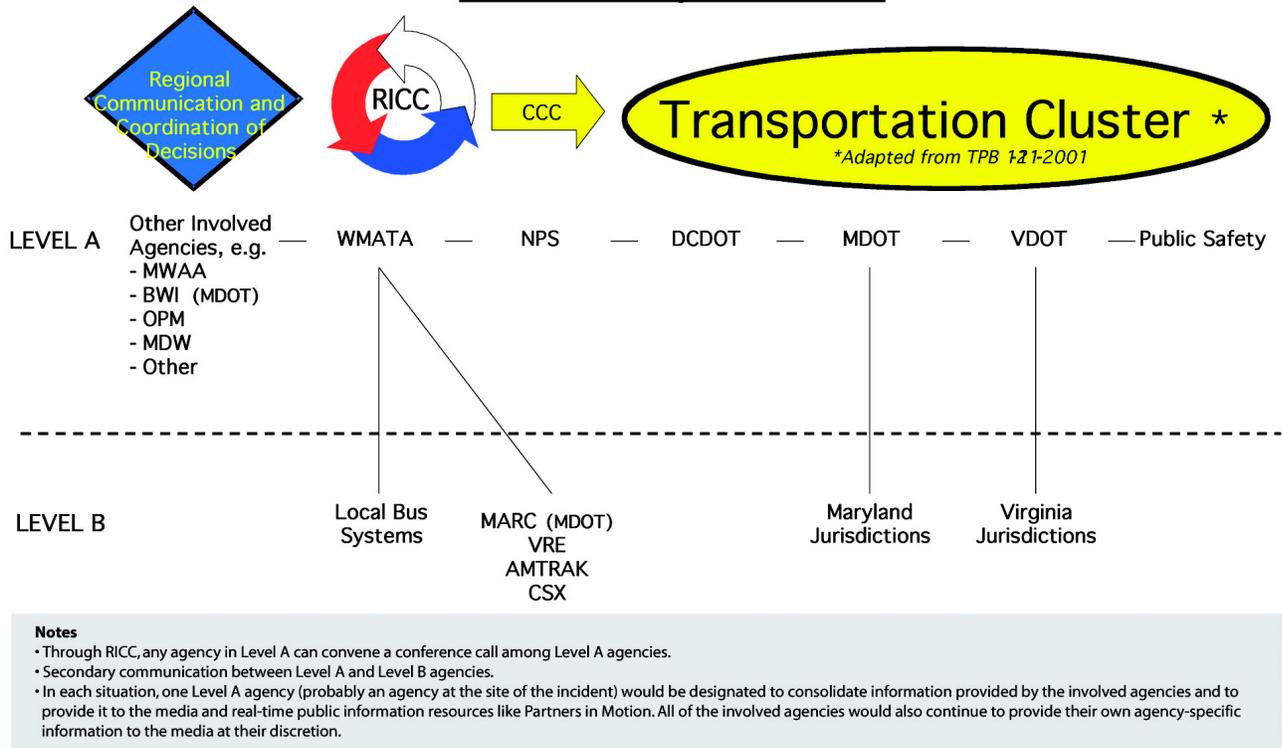


Figure 12. Transportation Cluster Communications Structure

A regional crisis or emergency transportation management plan or plans should be developed. An analogy is COG's existing "Snow Plan," where a deputized committee convenes a conference telephone call to make decisions about school and government closures because of weather. This panel empowered to manage a crisis, as well as other responsible parties, would benefit by having a good plan for transportation at its disposal. Such a system is already under development at the Metropolitan Washington Council of Governments (COG), which is using a multi-tiered system to provide information to agencies throughout the region. Key agencies like State Police agencies, MDOT, VDOT and WMATA would participate in coordination calls, and would in turn communicate proposed steps to agencies and municipalities (like VRE by WMATA, or MARC and the City of Rockville by MDOT) that are in the "second tier."

According to Ron Kirby of the COG, "The region's transportation system, particularly in times of emergency, needs to be managed in the most seamless, coordinated way feasible. This does not mean, of course, that a single entity will manage the system from a single location. A number of agencies differing by jurisdiction, mode, and function, will need to work together particularly well in time of crisis, as well as needing to do this on a daily basis. Transportation agencies must work collectively as well as individually to be prepared to manage the system daily and in crisis."

The greatest obstacle to effective response on September 11 was a breakdown in collective control: there was no effective coordination of command, control, and communications. An additional problem revolves around semantics and the types of terminology used by different agencies on opposite sides of the transportation/emergency management-public safety divide. There is a need for a vocabulary that has common meanings across jurisdictions, disciplines, and technical areas.

Decision-makers and operators must have available to them a fail-safe communications system. General outages, overloads, or other problems that might arise, such as what happened to landline and cellular telephones on September 11, must not affect this system. Essential transportation agency representatives must be included in the system.

It should be ensured that responsible crisis managers (e.g. the military) provide timely and important information to transportation managers, and that there be a feedback mechanism so transportation managers can inform crisis managers about transportation issues.

The region's transportation management centers must be bolstered. The geographic area of the region is currently not entirely covered, with improvements needed particularly for the District of Columbia (where a center is now in the engineering stages), Prince George's County (center under construction), and a few of the smaller jurisdictions. These and existing centers should have excellent communication links that are fail-safe. Centers may

need additional backups and redundancies, perhaps established at secondary locations, in case of damage, power outages, or other issues affect a primary location. These issues may have been considered individually by operating agencies, but it would be beneficial to consider them collectively. Overall, it is recommended to work to bring the whole region to the same level of transportation management capability.

1. Detailed Chronology

September 11, 2001

- 8:45 a.m.: First plane crashes into the north tower of the World Trade Center (WTC).
MDOT activated the Emergency Operations Center (EOC) (between the first and second attacks at the World Trade Center) and readied emergency operations plans. In addition, MDOT directed the Maryland State Highway Administration (SHA) and the Maryland Transportation Authority (MdTA) to keep as many people and as much equipment as possible on the roads.
- 8:50 a.m.: Metro Transit Police Department (MTPD) telephoned FBI Terrorism Task Force, Washington D.C. Field Office, to determine if any threats had been received for the District of Columbia. The response was negative.
- 9:03 a.m.: Second plane crashes into south tower of WTC.
- 9:08 a.m.: MTPD activated to Threat Condition Level Charlie in accordance with policy and procedures.
- 9:17 a.m.: FAA shuts down all NYC airports.
- 9:30 a.m.: President Bush, speaking in Sarasota, Florida, says the country has suffered an “apparent terrorist attack.”
- 9:40 a.m.: FAA halts all US flights.
Metrorail Operations on heightened state of alert.
- Soon after
9:40 a.m.: WMATA Transit Police receive a call from a representative with D.C. Police about a threat to Metro and that closing the system should be considered.
- 9:43 a.m.: American Airlines Flight 77 crashes into the Pentagon. Evacuation of building begins immediately. VDOT Statewide Transportation Emergency Operations Center (TEOC) is in the process of implementing a statewide terrorism alert when American Airlines Flight 77 crashed into the Pentagon after flying directly over the Smart Traffic Center (STC) in Northern Virginia.
Station manager at Pentagon reports possible bombing at the Pentagon.
- 9:45 a.m.: The White House and the Capitol are evacuated.
Metro Transit Police (MTPD) notified of Pentagon blast.
- 9:46 a.m.: Pentagon Metrorail station closed
- 9:53 a.m.: Arlington’s Emergency Operations Center (EOC) activated, and employees on the County’s emergency response teams make their way to the center
- 9:55 a.m.: Metrorail and Metrobus notified that Command Post is established by Chief McDevitt of MTPD.
All track maintenance canceled on entire railroad.
10 buses needed at Pentagon to be used as ambulances - increased to 20.
Metrorail ventilation system closed or on exit mode at Pentagon station.
- 9:57 a.m.: President Bush departs from Florida.

- 10:00 a.m.: America's military put on high alert status.
Metrorail Yellow Line trains re-routed to Blue Line.
- 10:05 a.m.: South tower of WTC collapses. Impact measures 2.1 on the Richter scale.
- 10:10 a.m.: A portion of the Pentagon collapses.
- 10:10 a.m.: United Airlines Flight 93, also hijacked, crashes in Somerset County, Pennsylvania, southeast of Pittsburgh.

(Within 30 minutes of the Pentagon attack, the Washington-area Traffic Operations Center (TOC) supervisor went to the Virginia DOT command center to help coordinate different traffic patterns and to assist otherwise as needed.)
- 10:16 a.m.: D.C. Mayor's chief of staff dispatched an e-mail telling hundreds of workers in the government's Judiciary Square headquarters to "EVACUATE BUILDING NOW."

This request was countermanded less than four minutes later.
- 10:22 a.m.: In Washington, the State and Justice departments are evacuated, along with the World Bank.
- 10:26 a.m.: Track inspection Rosslyn to Pentagon City - empty train - 1st.
- 10:28 a.m.: Captain reports car bomb explosion at State Department.
- 10:28 a.m.: North tower of WTC collapses.
- 10:30 a.m.: Federal Office of Personnel Management decided that 260,000 federal workers were free to go.
- 10:31 a.m.: Metro Center 13 & G - suspicious package.
- 10:32 a.m.: Amtrak, Virginia Railway Express commuter rail, and the Maryland Transit Administration's MARC commuter rail shut down rail service.
- 10:41 a.m.: Trains run through Pentagon station without stopping.
- 10:43 a.m.: Report of Camp David plane attack and explosion at the Census Building, Suitland.

Report from US Secret Service (through MPD Command Center) that plane hijacked with Metro "hub" as target. No definition of "hub."
- 10:45 a.m.: Blue Line restored - No station stops at Pentagon and Reagan National Airport stations.
- 10:46 a.m.: MPD Command Center requests Metrorail to cease operations due to hijack threat.
- 10:59 a.m.: National Airport closed.
- 11:01 a.m.: Union Station - US Capitol Police report of truck bomb in middle level parking garage. Amtrak Police on scene.
- 11:05 a.m.: Metrorail notified to run trains through Union Station without station stop.
- 11:29 a.m.: Sgt. Hamlin (Pentagon Field Command Post) reports northbound aircraft traveling at high rate of speed over Potomac River south of the city.
- 11:31 a.m.: Blue Line train service suspended temporarily. Blue Line trains to keep underground in area of Pentagon.

- 11:39 a.m.: Arlington County Manager Ron Carlee declared a local state of emergency.
- 11:41 a.m.: Report of Northbound aircraft false alarm - Sgt. Hamlin.
- 11:43 a.m.: Service restored to Blue Line.
- 11:44 a.m.: All above ground trains in Virginia suspended.
- 12:00 p.m.: Governor Jim Gilmore of Virginia declares a statewide emergency. In the address, Gov. Gilmore indicated that the Secretary of Transportation was directed to work with the US Navy to heighten security at the Port of Virginia. Additionally, the State Police was directed to ensure traffic flow in Northern Virginia.
- 12:22 p.m.: State of Maryland EOC established - Contingent of Montgomery County Fire and Rescue assigned to Pentagon and ACFD Chief Plaughter for search and rescue.
- 12:45 p.m.: Union Station / Amtrak reports partial service restoration to Union Station - one route will open at 1300 hours from Washington to Baltimore only.
- 1:15 p.m.: The Maryland Transportation Authority states that all facilities are under heightened security and remain open.
- 1:27 p.m.: A state of emergency is declared by the city of Washington.
- 2:30 p.m.: The FAA announces there will be no U.S. commercial air traffic until noon EDT Wednesday at the earliest.
- 4:00 p.m.: Virginia Department of Emergency Management announces that all northbound lanes on I-395 have been closed from the Beltway to Washington, D.C.
- 6:00 p.m.: Amtrak resumes passenger rail service.
- 6:30 p.m.: George Washington Memorial Parkway Reopened.
- 6:40 p.m.: Donald Rumsfeld, the U.S. defense secretary, holds a news conference in the Pentagon, noting the building is operational. "It will be in business tomorrow," he says.
- 6:42 p.m.: Roadway traffic is slowly returning to normal. U.S. Park Police have reopened the southbound GW Parkway and traffic on the Clara Barton and Rock Creek parkways is now moving in both directions. Constitution Avenue between 15th and 17th streets as well as 15th Street at Constitution Avenue has been closed. Traffic in the District has cleared up but a few areas in the Northwest are blocked off. Northbound I-395 is closed as well. Traffic signals in D.C. have been reprogrammed to the afternoon rush hour cycle. Pentagon and National Airport Metro stations are closed.
- 7:09 p.m.: Normal Metrorail service restored. No station stops at Pentagon and National Airport stations.
- 7:15 p.m.: Yellow Line bridge service restored.
- 7:20 p.m.: WMATA Command Center secured.
- 9:22 p.m.: CNN's McIntyre reports the fire at the Pentagon is still burning and is considered contained but not under control.

September 12, 2001

Interstate 395 is reopened; however, exit 8B at the Pentagon remains closed.

- 10:50 a.m.: Decision made to open National Airport Metrorail Station at 1500 hours for passengers with luggage problems.
- 10:56 a.m.: Mr. Gallagher/Chief McDevitt - access to Pentagon station limited to properly identified employees.
- 1:21 p.m.: WMATA Command Center terminated.

September 16, 2001

Amtrak and Greyhound report handling twice the normal number of riders systemwide since September 11. Rental cars also report a surge in business.

September 26, 2001

USDOT requests shippers and transporters of hazardous materials to consider altering routes to avoid populated areas whenever practicable.

September 30, 2001

OnStar communications adds real-time traffic reports in a dozen cities, including NYC.

October 2, 2001

American Media Inc. employee Robert Stevens, is diagnosed with inhalation anthrax and hospitalized in Florida

October 3, 2001

Transportation Dept. dispatches 300 inspectors to scan employee lists at companies hauling hazardous cargo.

October 5, 2001

Robert Stevens dies.

Intelligence officials tell the U.S. Congress that they believe a second major terrorist attack on the United States is highly likely in the near future

October 11, 2001

A warning of a "very real threat" of more terrorist attacks against the U.S. "over the next several days" is given by the FBI

October 12, 2001

NBC anchor Tom Brokaw's assistant revealed to have contracted skin form of anthrax after opening tainted mail.

October 15, 2001

President Bush announces that a letter sent to Senate Majority Leader Tom Daschle had anthrax on it.

October 17, 2001

House Speaker Dennis Hastert announces that the House of Representatives will close until next Tuesday to sweep the building and offices for anthrax.

Anthrax spores are found in a Senate mailroom located in an office building near the Capitol.

At least thirty Senate staffers test positive for traces of anthrax.

October 18, 2001

The FBI and U.S. Postal Service offer a \$1 million reward for information leading to the arrest of anyone responsible for sending anthrax through the mail.

October 20, 2001

Two postal employees in Washington die from inhalation anthrax.

Anthrax is confirmed at the Ford building on Capitol Hill.

The FBI locates the mailbox in New Jersey where anthrax letters were dropped.

October 21, 2001

Mayor Anthony Williams of Washington announces at a press conference that two postal workers at the Brentwood postal facility in Washington, D.C. are confirmed with anthrax and are hospitalized.

Tests begin on hundreds of Washington postal workers.

October 22, 2001

A third postal worker in Washington tested positive for inhalation anthrax.

October 23, 2001

Many Washington-area postal workers ask why they were not treated and tested earlier, and why Capitol Hill staffers apparently received priority attention.

Anthrax found in off-site White House mail center. Later President Bush emphatically tells reporters, "I don't have anthrax."

October 24, 2001

U.S. Postmaster General John Potter tells Americans, "There are no guarantees that mail is safe." He also advises Americans to wash hands after handling mail.

Six Washington, D.C. postal workers, from the Brentwood sorting office, hospitalized for suspected anthrax.

October 25, 2001

Anthrax found in another part of the Hart Senate Office Building.

October 26, 2001

A small amount of anthrax spores is found in a CIA mailroom. The CIA mail goes through the Brentwood mail facility.

A U.S. State Department mail handler is hospitalized with inhalation anthrax, and anthrax is found at a New York postal facility.

Anthrax is confirmed in an off-site U.S. Supreme Court mail facility.

October 29, 2001

U.S. Attorney General John Ashcroft and FBI Director Robert Mueller hold a press conference, and tell Americans to be on the alert for a "credible threat" within the next week against the United States.

Traces of anthrax are found in the mailrooms of the Supreme Court, the State Department, and the Health Department. Two new cases of anthrax are reported in New Jersey, bringing the number of confirmed cases to 15.

For the first time since 1935, the U.S. Supreme Court meets outside of its own building as the structure is swept for signs of anthrax.

October 30, 2001

The Federal Aviation Administration imposes flight restrictions around U.S. nuclear plants and advises 103 nuclear facilities to fortify security.

November 1, 2001

The FBI announces it has alerted law enforcement agencies in eight western U.S. states that it has unconfirmed information terrorists may be targeting suspension bridges on the West Coast.

November 2, 2001

Homeland Defense Secretary Tom Ridge issues an "indefinite" high alert against an undefined terrorist attack.

November 5, 2001

Anthrax is found in a Pentagon post office.

November 12, 2001

9:17 a.m.: American Airlines Flight 587 explodes in mid-air, crashing in Queens after takeoff from Kennedy airport.

November 16, 2001

Investigators find an anthrax-tainted letter addressed to U.S. Democratic Senator Patrick Leahy. The letter is found in a quarantined batch of unopened Capitol Hill mail. The handwriting on the letter is similar to the letter sent to Tom Daschle.

December 4, 2001

The United States' third post-September 11 terrorist alert coincides with a report that al-Qaida might be able to detonate a "dirty bomb" —an unsophisticated radiological weapon.

December 7, 2001

The U.S. Federal Reserve cancels a board meeting after anthrax is discovered in sacks of mail sent to the central bank.

December 15, 2001

The anthrax spores mailed to Capitol Hill are traced back to U.S. Army stocks after genetic matches are found at five U.S. laboratories.

December 19, 2001

After 99 days, the WTC fires are extinguished, and become the longest burning commercial fire in U.S. history.

December 20, 2001

The last remaining building at the WTC is taken down.

2. Literature Review: Information Sources and Documents Reviewed

Virginia Department of Emergency Management (VDEM)

"Disaster Field Office - Situation Report #1"

<http://www.vdem.state.va.us/newsroom/terrattack01sitreps/dfositrep1.htm>

"Emergency Management Update October/ November 2001"

"Pentagon Strike Part of Four Pronged Terrorist Attack on the U.S."

<http://www.vdem.state.va.us/emupdate/update01/emup1001.pdf>

"Emergency Management Update December 2001"

"Y2K Provided Blueprint for Arlington on September 11"

<http://www.vdem.state.va.us/emupdate/update01/emup1201.pdf>

Washington Post

"With Airport, Roads Close, Travel Stalls"

<http://www.washingtonpost.com/ac2/wp-dyn?pagename=article&node=&contentId=A165-2001Sep20>

"Washington Area Evacuations and Closures"

<http://www.washingtonpost.com/wp-srv/metro/daily/sep01/localclosures091101.htm>

"Metro Declined Police Proposal To Close Sept. 11 – Suggestion Would Have Stalled Exodus From City"

<http://www.washingtonpost.com/ac2/wp-dyn?pagename=article&node=&contentId=A43069-2001Sep28>

"Area Traffic Returning to Normal"

<http://www.washingtonpost.com/ac2/wp-dyn?pagename=article&node=&contentId=A12142-2001Sep11>

"Washington Metro Faults Evacuation Plan For Area"

<http://www.washingtonpost.com/wp-dyn/articles/A18278-2001Oct18.html>

"Washington Metro Officials Review Actions In Terror Scare"

<http://www.washingtonpost.com/wp-dyn/articles/A40095-2001Oct10.html>

"Communications Slows Metro Drill"

<http://www.washingtonpost.com/wp-dyn/articles/A64931-2001Dec5.html>

"Metro Drill Tests Response to an Attack"

<http://www.washingtonpost.com/wp-dyn/articles/A58485-2001Dec4.html>

"District Unprepared to Cope with Attack"

<http://www.washingtonpost.com>

"Transportation Begins to Recover From Turmoil"

<http://www.washingtonpost.com>

AASHTO

"Roundtable Discussion on National Security" (sponsored by AASHTO Task Force on Transportation Security)

ABC 7 News

"Road near Pentagon to re-open Monday"

<http://www.wjla.com/showstory.hrb?f=n&s=17823&f1=loc>

Virginia Department of Transportation (VDOT)

"VDOT's Arterial Management Response" (White, Jeris)

"Summary of Lessons Learned from Pentagon Attack"

"FHWA Feedback on VDOT 9/11 Case Study"

FOCUS, Turner-Fairbanks Highway Research Center

"September 11 and Beyond: Highway Agencies Respond to Keep America Mobile and Secure"

<http://www.tfhrc.gov/focus/nov01/nineoneone.htm>

Maryland State Highway Administration

"Maryland's Reaction and Response to the Events of September 11 – A Case Study"

Maryland Transportation Authority (MDTA)

"Toll Facilities to Remain Open at This Time, September 11, 2001 (1315)"

http://www.mdt.state.md.us/cgi-bin/emergency_display_choice.pl?facility=Francis+Scott+Key+Bridge&position=2

"Toll Facilities to Remain Open at This Time, September 11, 2001 (1600)"

http://www.mdt.state.md.us/cgi-bin/emergency_display_choice.pl?facility=Francis+Scott+Key+Bridge&position=1

"Toll Facilities to Remain Open at This Time, September 12, 2001 (0900)"

http://www.mdt.state.md.us/cgi-bin/emergency_display_choice.pl?facility=Francis+Scott+Key+Bridge&position=0

Maryland Emergency Management Agency

"Governor Glendening Calls for Calm in the Aftermath of the World Trade Center and Pentagon Terrorist Attacks"

<http://www.mema.state.md.us/newspr4.html>

Council of Governments (COG)

"Developing Transportation Emergency Response Policies and Procedures in the National Capital Region"

Presentation by the Honorable John Mason, National Capital Region Transportation Planning Board to the Metropolitan Washington Council of Governments Ad Hoc Task Force on Homeland Security and Emergency Preparedness, 11/07/2001

Board Agenda and Backup Package

Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, December 19, 2001

Government e-business

"Command Centers In Control"

<http://www.fcw.com/geb/articles/2001/0910/web-dcmd-09-14-01.asp>

Fairfax Journal

"Evacuation Plans Take Priority Over Area's Gridlock"

http://199.244.139.109/dcwww?-show:client/journal/FFX/j2001/q4/m10/t17/pa/s009/001_001_001.dcs

Arlington Journal

"Commuters Driven to Alternatives"

http://199.244.139.109/dcwww?-show:client/journal/ARL/j2001/q3/m09/t20/pa/s001/002_001_001.dcs

"Time to Rethink Evacuation Routes"

http://199.244.139.109/dcwww?-show:client/journal/ARL/j2001/q4/m11/t07/pa/s006/002_001_001.dcs

"Evacuation Plans Take Priority Over Area's Gridlock"

http://199.244.139.109/dcwww?-show:client/journal/ARL/j2001/q4/m10/t17/pa/s004/002_001_001.dcs

"Planning Ahead"

http://199.244.139.109/dcwww?-show:client/journal/ARL/j2001/q4/m10/t02/pa/s006/002_001_001.dcs

Federal Transit Administration

Practical Security and Emergency Response Advice from New York and Washington D.C.

<http://www.fta.gov/office/public/c1201/attach.html>

American Public Transportation Association

Passenger Transport

"Public Transit Reacts to Horrific Terrorist Attacks"

<http://www.apta.com/news/pt/0917-response.htm>

CBS MarketWatch

"Ground Transport Begins to Move"

<http://cbs.marketwatch.com/news/story.asp?guid={12D18310-B484-4804-A33E-DFA7F6BE9B75}&siteid=mktw&archive=truereg>

"Some Ground Transport Also Paralyzed"

http://cbs.marketwatch.com/news_story.asp?guid=%7B71479BA6%2D0D9D%2D4E9F%2DA322%2D681415AAA17F%7D&siteid=mktw

U.S. Department of Transportation

"Remarks for the Honorable Norman Y. Mineta Secretary of Transportation: AASHTO 87th Annual Meeting and Trade Fair Opening Session"

<http://www.dot.gov/affairs/120301sp.htm>

Federal Emergency Management Agency (FEMA)

09/11/2001 FEMA Responds to Terrorism Attacks

FEMA's Incident Command System (ICS) serves as a general model for emergency response

FEMA's Rapid Response Information System (RRIS) serves as a guide for response to chemical, biological, and/or nuclear incidents

White House (www.whitehouse.gov)

10/03/2001 Federal Response: Examples of Government Action Since September 11

3. National Agency and Association Activities Related to Transportation Security

Currently all of the listed agencies are in the planning process for their proposed responses to the September 11 attacks. Below are the current planned or developing responses to the September 11 attacks by government agency or organization.

Transportation Security Administration (TSA)

The President signed the Aviation and Transportation Security Act, establishing the Transportation Security Administration, into law on November 19, 2001. TSA's main mission is to increase airline and airport security. TSA will play a critical role, coordinating with the White House Office of Homeland Security, federal, state, local, and private partners, to enhance the safety of the nation's transportation infrastructure. TSA will be the focal point for the security of the entire national transportation system; a system administered in large part by states and localities. So far, TSA has concentrated primarily on aviation security and port security, but some attention has been paid to the transportation of hazardous materials and petroleum products.

Federal Transit Administration (FTA)

The FTA has requested that the Volpe National Transportation Systems Center (Volpe Center) design, implement, and evaluate Emergency Preparedness and Security Forums throughout the nation. These forums are designed in two parts: the first covers emergency preparedness, specifically emergency response and recovery; and the second deals with security, with an emphasis on developing and implementing security plans. The two-day forums consist of scenario group breakouts, discussions by experts in the field and emergency response models. Additionally, several transportation agencies have joined with this program as partners with the FTA. The Federal Railroad Administration (FRA) is serving as a partner in this project, specifically in regards to commuter rail services. Additionally, the American Public Transit Association (APTA) has assisted the FTA in developing course materials and outreach. (See below for additional information on APTA) The FTA is also working with Amtrak regarding its participation in these forums.

FTA has targeted transit security personnel, fire and police personnel, city and state emergency management coordinators, emergency medical personnel, and hospital disaster relief coordinators. FTA, through the Volpe Center, has already conducted initial surveys to determine regions throughout the country where agencies demonstrated both a need and interest in participating in such a forum.

Currently, the FTA is preparing to host between 12 and 15 of these forums. These forums will begin on May 15-16, 2002 with a "Kickoff Forum" in Orlando, Florida, followed by sessions in Philadelphia on June 19-20, 2002 and in Seattle, Washington on July 24-25, 2002. Additional forums will take place in fourteen additional locations throughout the United States, occurring roughly once a month until 2003. More information for this program can be found on the FTA's Office of Safety and Security's website, www.transit-safety.volpe.dot.gov. The contact person for this program is Bob Adduci at the Volpe Center.

United States Coast Guard (USCG)

Throughout the nation, The United States Coast Guard has authorized Port Captains to institute task lists for all stakeholders in their region. These stakeholders include Port Authorities, ferry operators, freight transporters, and other commercial operators who operate in the harbors, seaways, and rivers covered by the USCG.

Additionally, the Coast Guard has increased security patrols and personnel throughout the country. This process actually began immediately after the September 11 attacks and appears to be continuing for the foreseeable future. The Coast Guard is working closely with the Transportation Security Administration to ensure port and maritime security.

Federal Highway Administration (FHWA)

Representatives from both the FHWA and the Joint Program Office have met with members of the Volpe Center to discuss the possible adoption of the FTA's Emergency and Security Preparedness Forums to meet the objective of the FHWA.

Additionally, the FHWA is preparing and/or realizing vulnerability assessments, establishing assessment teams, and developing case studies from various disasters such as the September 11 attacks and the Baltimore Tunnel Fire. Further, the FHWA is adapting their regional workshop series on regional integrated operations to regional emergency management workshops. Currently, the FHWA is hoping to have the Federal Emergency Management Agency (FEMA) and American Association of State Highway and Transportation Officials (AASHTO) co-sponsor the workshops. The contact person for this information and program is Vince Pearce at the Operations Core Business Unit.

American Association of State Highway and Transportation Officials(AASHTO)

In response to the September 11 attacks AASHTO has established a Task Force on Transportation Security. This Task Force includes State transportation officials and representatives of US DOT and the Department of Defense. The Task Force has identified several tasks that are to be completed in the first quarter of 2002. These tasks include preparing a vulnerability assessment

handbook for State DOTs, preparing case studies on State DOT responses on September 11 and preparing a legislative proposal for special national security funding of highway facilities.

Results from the *AASHTO/TRB Security and Emergency Response Survey* of the states revealed the following information:

- ◆ 98% of the respondents have emergency response plans for natural disasters while only 70% have some plans for terrorist attacks;
- ◆ 37% of the respondents have training resources for security and 59% have some surveillance capabilities on their bridges;
- ◆ With regard to the factors for determining which infrastructure is critical for protection, the following factors were listed in rank order of importance: vulnerability to attack, cost to repair/replace, economic impact, symbolic nature of the asset, time to repair/replace, and environmental consequences.

American Public Transportation Association

APTA has been an active partner in developing a transit response to the attacks of September 11. APTA has contributed both materials and resources for the forum developed by the FTA. Further, Greg Hull has authorized the use of various materials to be used by the FTA in developing a CD that contains all current security publications throughout the industry. APTA is also providing membership lists to aid in the mailing of Security Forum brochures and registration materials.

Preliminary Analysis for the Washington, D.C. Network using HOWLATE

September 11, 2001

A preliminary analysis was done based on the HOWLATE methodology using travel time data archived from the SmarTraveler web site for September 11, 2001. On any given day SmarTraveler reports travel time information on 33 facilities Washington, D.C., which is archived every five minutes from 6:30 AM to 6:30 PM by Mitretek Systems. Thus, there are a total of 4785 (145 x 33) archived travel time reports for each day. It should be noted that on September 11, 2001 SmarTraveler did not report travel time information for a total of 296 records (6%), and this was between 11:40 AM and 3:25 PM. The impacts on a commuter on this day were compared to results from a previous study conducted to evaluate the benefits of pre-trip ATIS in Washington, D.C. for the period from June 1, 2000 to May 31, 2001 (*"On-Time Reliability Impacts of Advanced Traveler Information Services (ATIS), Volume II," Draft Report, Prepared by Mitretek Systems for FHWA, Oct 2001.*). The performance was examined only for the period between 9:30 AM to 6:30 PM, since this was the period immediately following the incident.

When compared to a typical day, on September 11, 2001, a commuter experienced:

- ◆ An increase in stress by more than a third
- ◆ More than triple the risk of being late than normal
- ◆ More than 3 times the increase in late schedule delay
- ◆ 26% reduction in just-in-time reliability
- ◆ 11% increase in early schedule delay
- ◆ Nominal increases in travel time (increase of 0.9%), average delay (3%) and travel expenditure (2.4%)

Tables 1 to 3 enumerate the impacts on a commuter who relied only on past experience (Non-ATIS), and a commuter who made use of traveler information reports (ATIS) on September 11 when compared to the experiences of a Non-ATIS user on a typical day of the year. From Tables 2 and 3 it is evident that the midday congestion was as bad as the pm peak congestion.

Figure 13 illustrates the impact on commuter travel time for the period from 9:30 AM to 6:30 PM. The figure shows the percentage increase in travel time from normal for trips originating from the colored regions. For example, in Downtown D.C., trips starting from regions colored red experienced a 10-15% increase in travel time from normal. It is clear from the figure that majority of the impact was felt by commuters leaving D.C.

Table 1. Performance of Non-ATIS and ATIS Users on September 11,2001 from 9:30 AM to 6:30 PM

MOE	Avg. for a Non-ATIS User for the Year (06/01/00 – 05/31/01) from 9:30 AM – 6:30 PM	Average on 9/11/01	
		ATIS	Non-ATIS
Travel Time	31.8 min	32.1 min	30.6 min
Average Delay	9.8 min	10.1 min	8.6 min
Stress per trip	\$2.9	\$4	\$2.4
On-Time Reliability (Lateness Risk)	95.9% (4.1%)	85% (15%)	97% (3%)
Just-In-Time Reliability	60.1%	44.4%	79.3%
Travel Expenditure	40.7 min	41.7 min	38.1 min
Late Schedule Delay	2.6 min	8.4 min	2.9 min
Early Schedule Delay	15 min	16.3 min	12.1 min

Table 2. Performance of Non-ATIS and ATIS Users on September 11,2001 during Midday (9:30 AM – 4:00 PM)

MOE	Avg. for a Non-ATIS User for the Year (06/01/00 – 05/31/01) During Midday	Average on 9/11/01	
		ATIS	Non-ATIS
Travel Time	29.2 min	32 min	31 min
Average Delay	7.2 min	10 min	9 min
Stress per trip	\$2.4	\$3.2	\$2.4
On-Time Reliability (Lateness Risk)	95% (5%)	80.3% (19.7%)	96% (4%)
Just-In-Time Reliability	72.8%	61.4%	83.1%
Travel Expenditure	36.1 min	37.7 min	38 min
Late Schedule Delay	2.7 min	7.2 min	3.5 min
Early Schedule Delay	13.7 min	13.4 min	11.6 min

Table 3. Performance of Non-ATIS and ATIS Users on September 11,2001 during the PM Peak Period (4:00 – 6:30 pm)

MOE	Avg. for a Non-ATIS User for the Year (06/01/00 – 05/31/01) During PM Peak	Average on 9/11/01	
		ATIS	Non-ATIS
Travel Time	34.4 min	32.2 min	30.1 min
Average Delay	12.4 min	10.2 min	8.1 min
Stress per trip	\$3.5	\$4.5	\$2.5
On-Time Reliability (Lateness Risk)	96.7% (3.3%)	89.7% (10.3%)	98% (2%)
Just-In-Time Reliability	47.5%	27.4%	75.4%
Travel Expenditure	45.4 min	45.8 min	38.1 min
Late Schedule Delay	2.5 min	9.6 min	2.4 min
Early Schedule Delay	16.2 min	19.2 min	12.5 min



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